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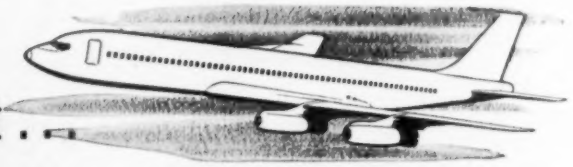

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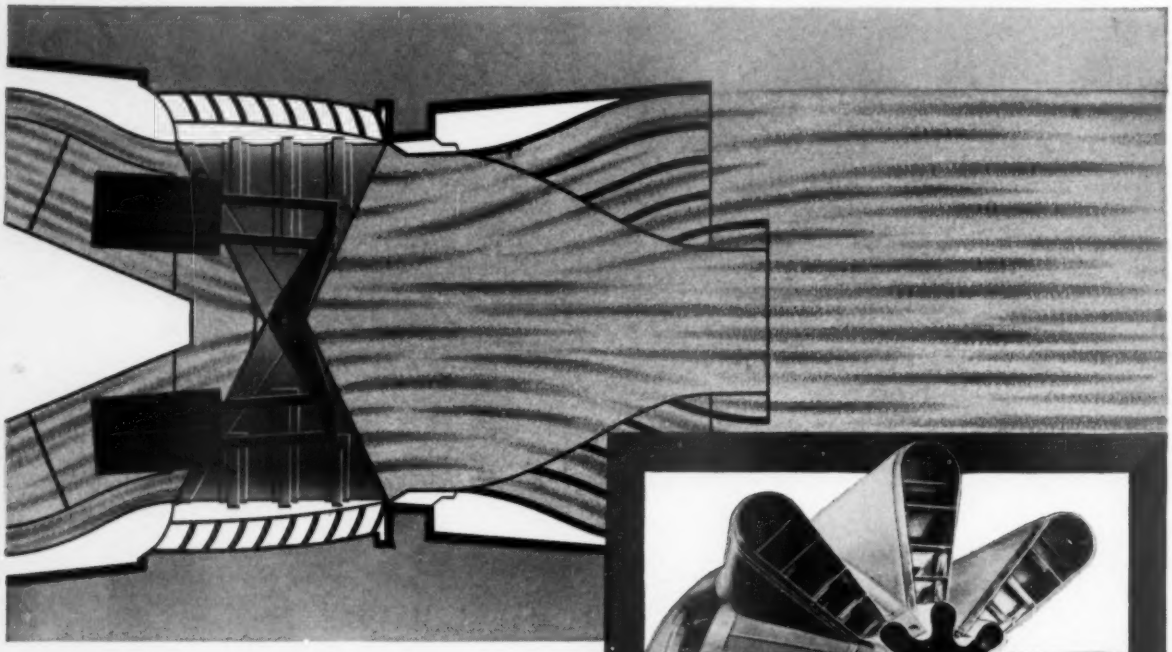

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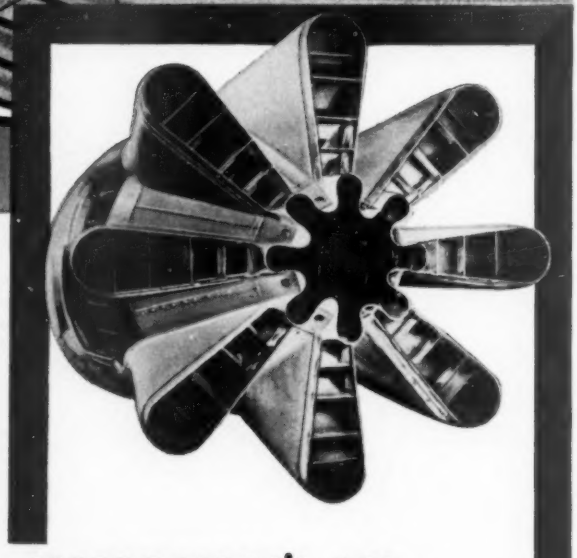

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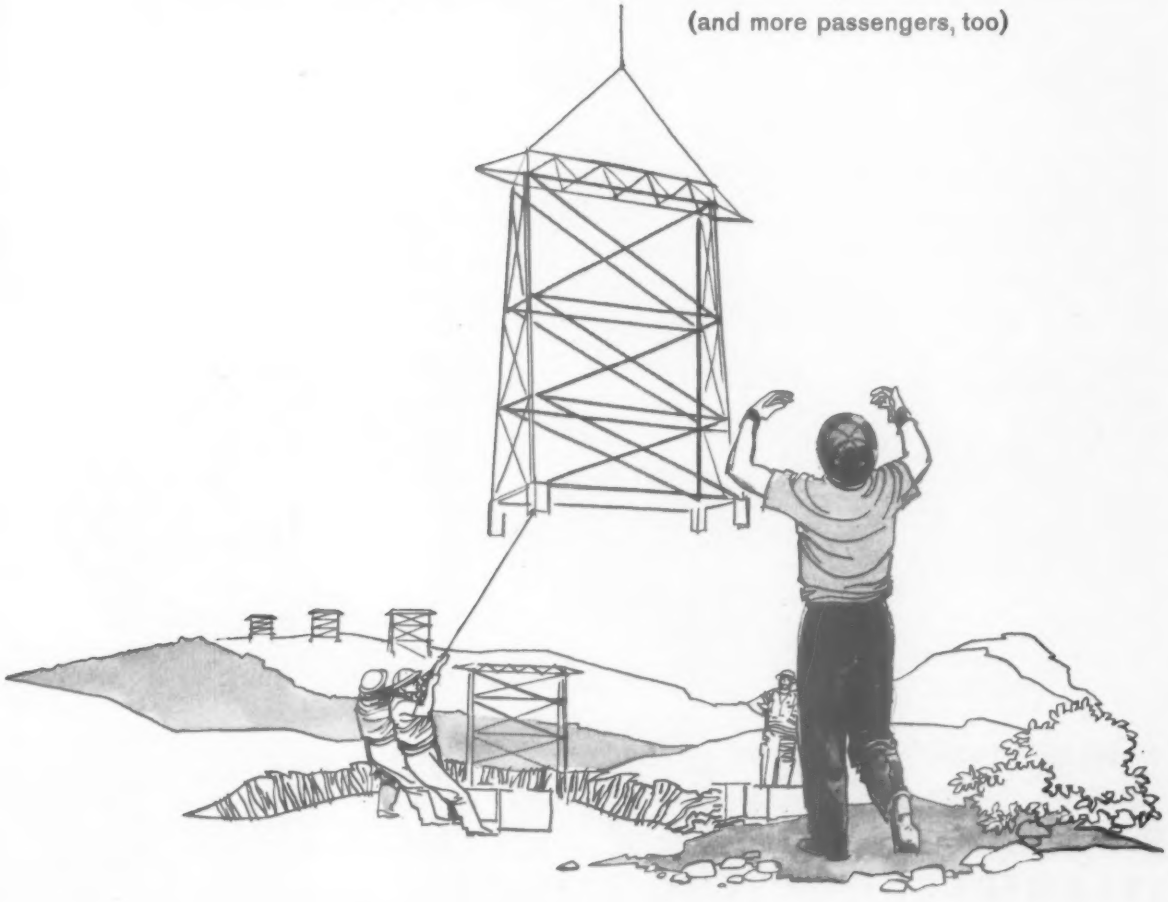

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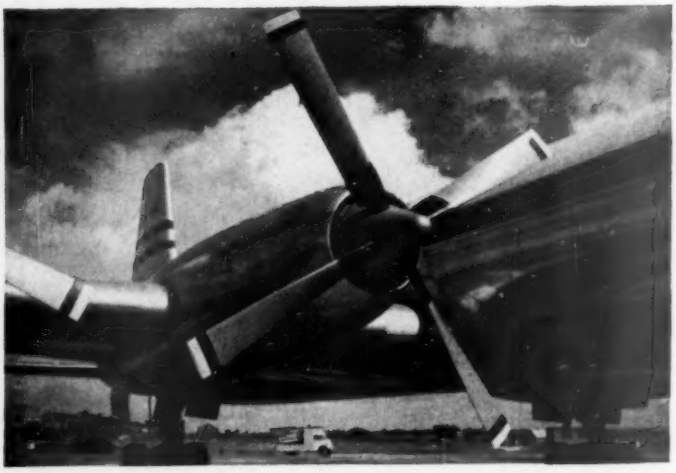

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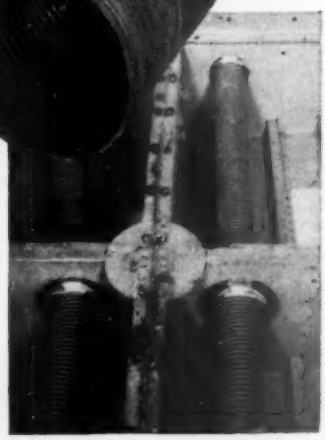

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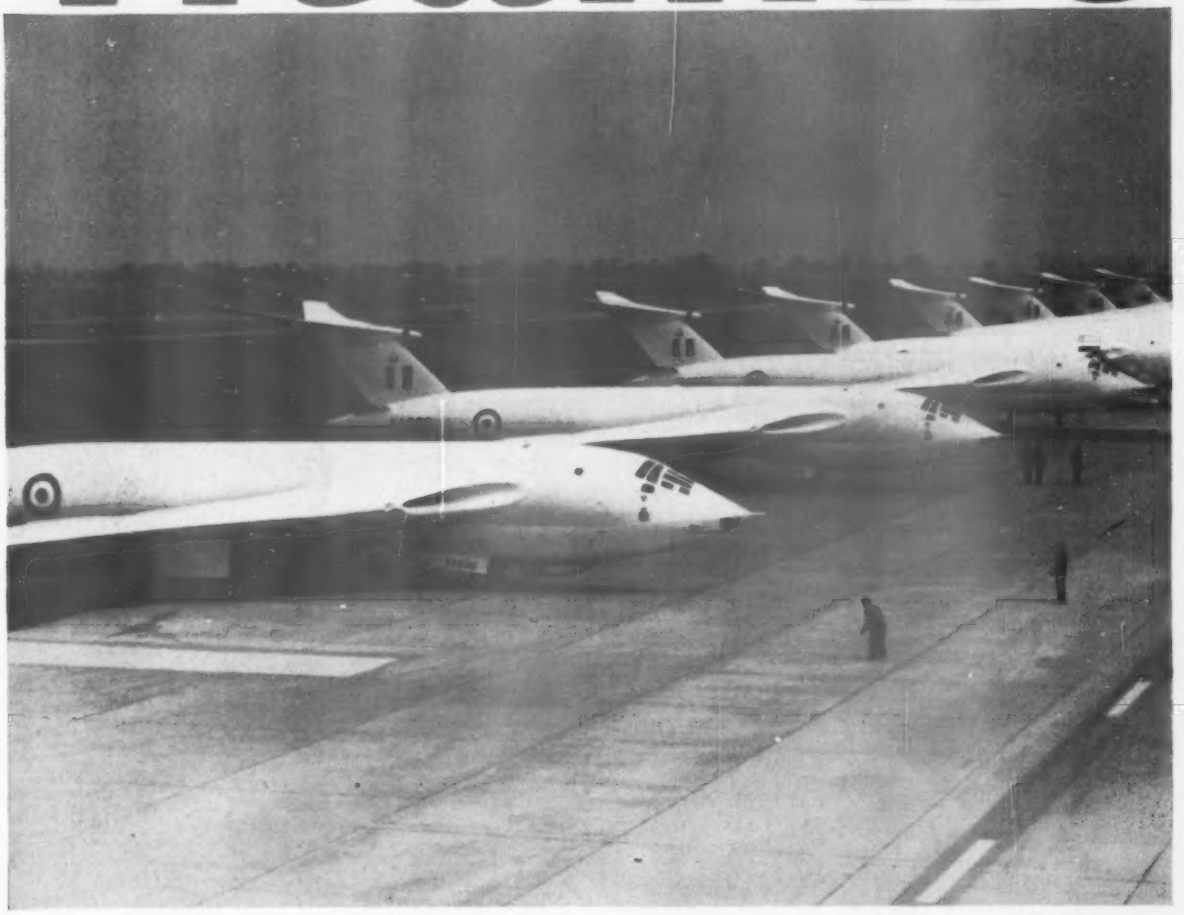

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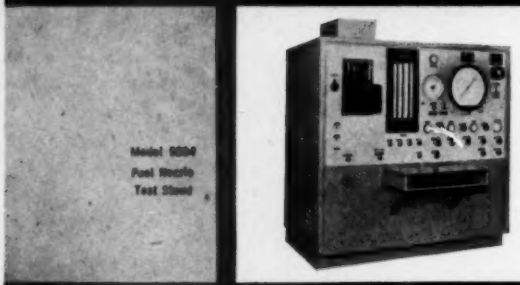

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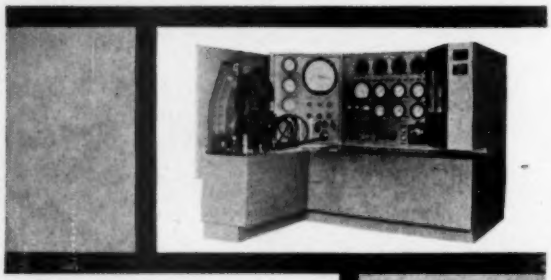

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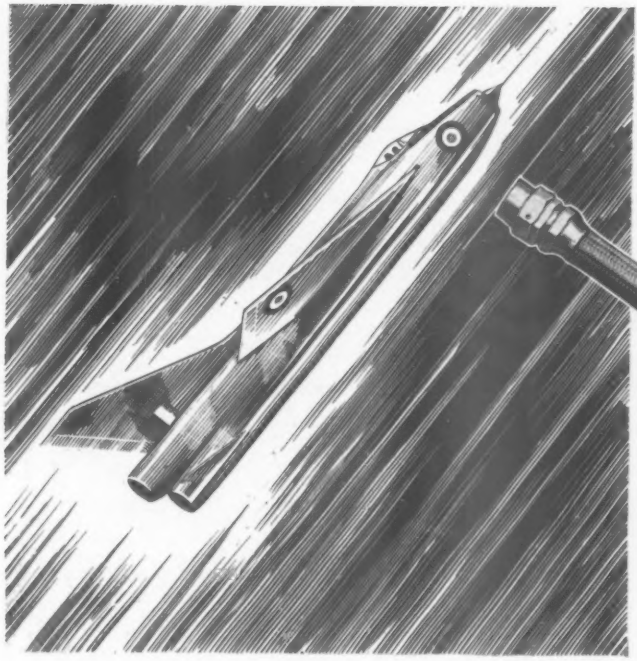

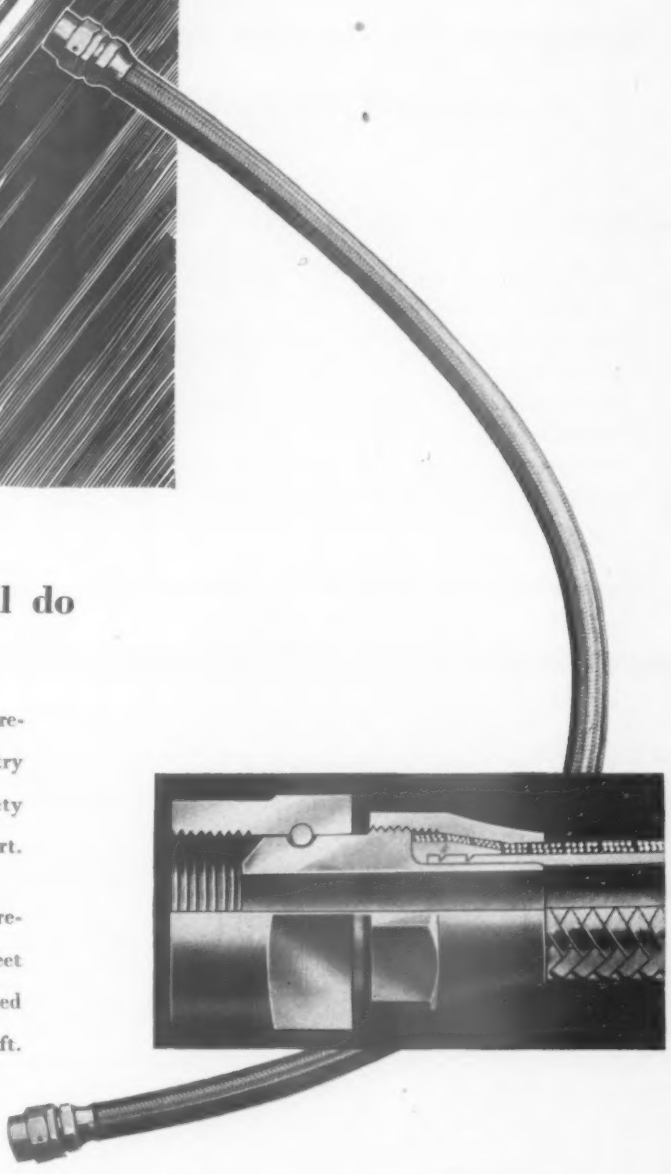

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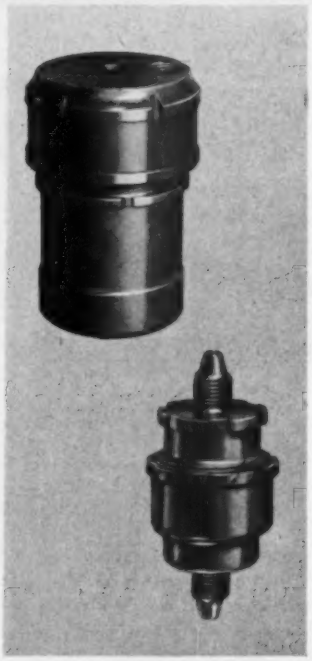

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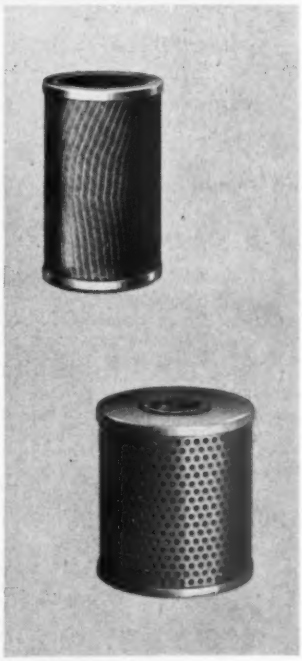

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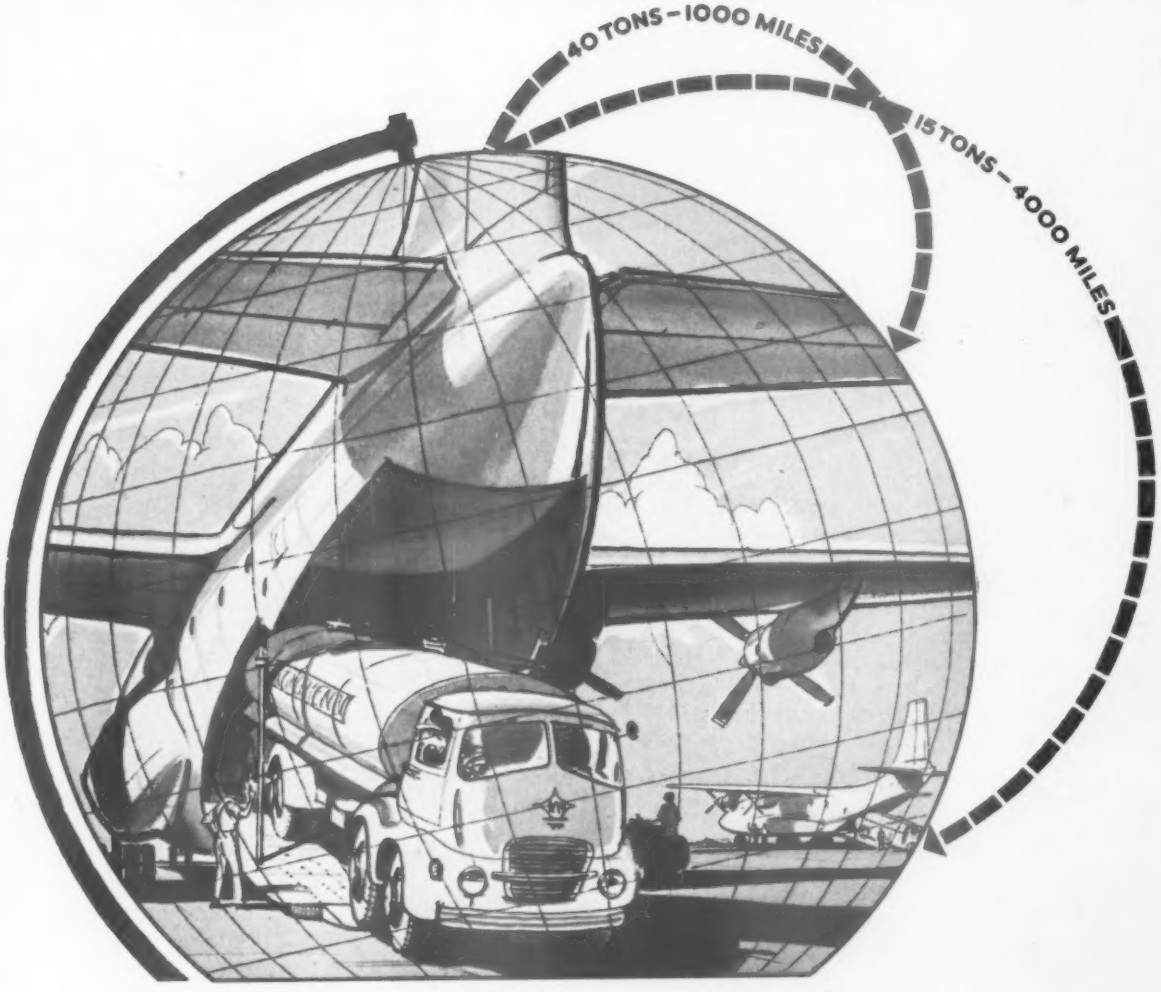

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THE AEROPLANE and ASTRONAUTICS

VOLUME 97 NUMBER 2496 AUGUST 21, 1959

Short-haul Struggle

Signing of the B.E.A. contract for the Airco D.H.121 marks the start of a technical and commercial battle of great importance to the British Aircraft Industry. With it go our hopes of breaking into the relatively new market for the short-haul turbojet transport and of achieving a sales success comparable with that achieved by the Viscount.

A struggle for supremacy or even equality in this field will not easily be won. On the other side of the Atlantic Douglas has announced the details of the DC-9, described and illustrated in last week's issue, and Boeing may yet be offering the still-unspecified 727. In Europe we have to meet competition from future developments of the Caravelle which is already in airline service.

The 121 has at least two specific advantages. It has been "made to measure" for operations over sector distances up to 1,200 miles and should, therefore, have better economics than an aircraft of the same capacity designed for a wider variety of hauls. And it has the aft-engined formula, pioneered by Sud Aviation, carried to a logical compromise conclusion in terms both of take-off/cruise-power balance and passenger/crew confidence.

But we also hope that the attractions of the short-haul turbojet will not cause operators to forget their duty to provide the lowest fares for present and prospective customers—and that means making sure that their fleets include a proper proportion of transports with exceptionally low seat-mile costs. It has yet to be shown that the turbojet can be as cheap to operate as, let alone cheaper than, the turboprop.

The Missing Plan

Shortly after the offer on behalf of the Hawker Siddeley Group for Folland Aircraft, Ltd., became known, a leading industrialist and one well known in the British Aircraft Industry, Sir George Dowty, warned that the growth of the British Aircraft Industry over the years has been due almost entirely to Government orders and whether many of our large aircraft constructors can survive will depend on the size of the industry that the Government will support.

It will be remembered that during the year the Dowty group acquired the business of Rotol, Ltd., and its subsidiary companies, British Messier, Ltd., and Rotol Incorporated (U.S.A.). This was financed by the issue of further shares bringing the total issued capital to £3,360,000. Sir George recalled that the Rotol sales are made up largely of civil aviation business, which he hoped will not suffer the same decline as that foreseen for military work.

In that part of his statement which dealt with aircraft, Sir George went on to say that no industry can exist without adequate orders and the Aircraft Industry is no exception. Clearly there is insufficient civil business to provide work for more than a fraction of those now employed in it.

One difficulty of those engaged in the production of new civil airliners is the necessity to forecast the numbers over which the development costs can be spread. In the desire to obtain business against keen competition, caution has often been thrown to the winds and far too optimistic estimates have been made which could prove disastrous.

The British Aircraft Industry has shown that it can produce as good aeroplanes as any other country, but the market is both difficult and peculiar. The U.S. aircraft manufacturers, our main competitors, are

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supported thoroughly by their Government, and without Government orders the British Aircraft Industry cannot continue to operate.

Many industries exist by the demands made upon them by the nationalized industries, the Ministry of Supply or other agencies of Government, and the problem now facing the Aircraft Industry is the lack of knowledge of the volume of Government orders that can be expected. The White Paper on Defence, published in 1957, outlined the future of military aviation policy of the Government and the reduced demand for man-carrying military aeroplanes, but the Industry is still without any forward programme.

To which we would add that nothing much can be expected till after the election but it will be surprising if the successful party in that contest has not undertaken during its electioneering to set up that Aircraft Planning Board without which no continuity in forward planning can be expected.

Matters of Moment

Argosy Ahead of Schedule

FLIGHT development of the Armstrong Whitworth Argosy is now two months ahead of schedule; five Argosies have flown since the maiden flight of the first last January. More than 350 test-flying hours have been completed and the programme calls for unlimited airworthiness certification by next March. Tropical trials at Khartoum and Nairobi will start at the beginning of September and will be followed by cold-weather trials in Canada.

The R.A.F. order for the A.W. 660 military version of the Argosy is likely to be placed soon. The A.W. 660 will be about 20% heavier than the Argosy, and will have an all-up weight of about 100,000 lb. It will have vertically opening clam-shell rear doors for the dropping of paratroops, supplies and equipment; the crew will be four, compared with two in the civil aircraft; radio and navigation equipment will be different and the fuselage nose will not open for freight loading.

Argosy sales are expected to increase during the next year when it is hoped that about 40 will be ordered. A firm letter of intent covering four Argosies has been received from Riddle Airlines of Miami and three more aircraft are covered by a similar agreement with an unnamed operator whose name cannot be given.

West Malling and Local Flying

REOPENED again as an all-weather fighter base after being closed for nearly two years, R.A.F. West Malling (Gp. Capt. C. N. Foxley-Norris, D.S.O., O.B.E.) has, with the return of No. 85 Squadron (Wg. Cdr. G. A. Martin, D.F.C., A.F.C.), equipped with Javelin FAW.2s and 6s, on August 5, become the only operational Fighter Command station south of the Thames. With the return of flying to the station a number of new air traffic restrictions have been brought into force, including the setting-up of the West Malling Communications Zone within the London Terminal Control Area.

Within this "special rules" zone, a rectangle bounded by straight lines joining Gravesend in the north, a point five miles east of Maidstone to the east, Frant in the south and Oxted to the west, all military and civil aircraft movements between ground level and 3,000 ft., or 2,000 ft. in the northern triangle, come under the control of West Malling tower during all hours when the station is working. Above an altitude of 3,000 ft. the air space forms part of the London Terminal Control Area up to the normal height of 25,000 ft.

All military flying is prohibited above 3,000 ft. in the area. The Javelins of No. 85 Squadron have to leave and return to West Malling from the east between 2,000 ft. and 2,500 ft. until they are clear of the London Terminal Control Area. As the normal take-off direction is westward, this involves a 180° turn to the north directly after getting airborne.

For civilian pilots flying aircraft not equipped with radio, who therefore cannot comply with the general rules, a one-mile wide air corridor extending up to 600 ft. above ground level has been brought into operation along the Redhill-Tonbridge-Ashford railway line from the south-western to the south-eastern boundaries of the zone. In addition, pilots wishing to enter or leave the western end of this corridor through the new zone may fly through the Gatwick Control Zone without IFR clearance provided they follow the Oxted-Edenbridge railway line between the northern boundary of the Gatwick Control Zone and the point where that railway crosses the Redhill-Ashford line; thence along the latter line to the common boundary between the two zones.

The introduction of this new restricted flying zone which, with the Gatwick Control Zone and the London Terminal Control Area, forms a 25,000-ft. high curtain 35-40 n. miles across the south-eastern area of the country can only add difficulties to the light aircraft owner. All pilots flying to the Continent or Lympne from such airfields as Croydon and Biggin Hill pass through this air space, apart from the civil transports operating between the U.K. and the Continent.

On the other hand, the R.A.F. would not move back into this difficult control area with all-weather fighters operating on a 24-hr. basis without good tactical reasons. The position will become even more trying next year when another Javelin squadron—No. 41—is to be transferred to West Malling.

During his tour of Basildon New Town on August 5 the Prime Minister visited Teleflex Products Ltd. Here Mr. E. Spurge, chief designer of the aircraft division, explains to him the new Teleflex inertia lock crew harness which is to be used in all B.E.A. Viscount, Vanguard, Comet and D.H.121 aircraft.

Airworthiness and the Future

ONE of the main points made in the 22nd annual report of the Air Registration Board concerned the serious effect of the cut-back in military aircraft orders on the amount of research and, therefore, on airworthiness practice which is often dependent on this research. In the past, civil aircraft, engines, equipment and instruments have all profited from military counterparts and sound airworthiness practice has, in turn, been dependent on the knowledge gained. The Board is convinced that means must be found to continue research and development on a generous scale.

During the past year the A.R.B. has amended the British

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Civil Airworthiness Requirements to meet those of the American F.A.A., where these were considered to be advantageous. The result has been that aircraft complying with the 1959 B.C.A.R.s will now, when a relatively few "special conditions" have been met, be acceptable to the F.A.A. as well as to the A.R.B.

So far as the future is concerned, attention is being given by the Board to supersonic-aircraft problems, including the gust structure of the atmosphere at high altitudes, the gust response of various aircraft plan forms, stability, handling characteristics at take-off and on approach, field-length criteria, icing, fuel reserves and the automatic devices on which, with supersonic aircraft, there must be greater reliance. The Board has now set up a Supersonic Aeroplane Airworthiness Committee.

Folland to Merge

A FURTHER step in the regrouping of the British Aircraft Industry took place last week when a formal offer to purchase all the ordinary shares of Folland Aircraft was made on behalf of Hawker Siddeley Group, Ltd. The price is 10s. 6d. for each 10s. share. Acceptance of the offer by the directors of Folland Aircraft, Ltd., was recommended unanimously. And they are accepting it in respect of their own holdings. The offer will remain open until September 4.

Mr. W. E. W. Petter, managing director and chief engineer, who joined the company from English Electric in 1950, will shortly be relinquishing his position. Compensation of £15,000 has been mentioned. Mr. E. N. Egan, the assistant managing director, who joined the company in 1936, will also be leaving shortly.

Founded in 1936 as British Marine Aircraft, Ltd., to build Sikorsky flying-boats under licence, the company's name was changed after Mr. H. P. Folland joined it in 1937 as managing and technical director. In a sense the merger may be regarded as a return to the fold, for the late Mr. Folland achieved fame as the designer of some notable Gloster aircraft.

Hawker Siddeley Developments

A CENTRAL advanced projects unit has been formed by Hawker Siddeley to work on advanced designs for the Group as a whole—in the fields of supersonic transports, manned and unmanned vehicles and "various other aspects of astronautics." This new unit will be headed by Mr. J. C. Floyd, F.R.Ae.S., F.C.A.I., M.I.A.S., a director and vice-president, engineering, of Avro Aircraft, Ltd., in Canada.

In his new appointment, Mr. Floyd—who remains on the board of Avro Aircraft—will be responsible to Mr. Stuart Davies, technical director of Hawker Siddeley Aviation, Ltd. According to a statement by Sir Roy Dobson he will draw on all the research, design and development facilities within the Group and his team's work will have top priority. The unit will be staffed by "key men" from companies within the Group including Avro Aircraft. Sir Roy said that the new unit was necessary because of the increasing complexity of modern aircraft, missiles and problems associated with the coming space age. It is to be located at Kingston.

An early appointment is that of Dr. W. F. Hilton, who is transferring from Sir W. G. Armstrong Whitworth Aircraft, Ltd., of Coventry.

Dr. Hilton joined Armstrong Whitworth Aircraft nine years ago as chief aerodynamicist, and was given a free hand to design and build the company's supersonic wind tunnel.

Dr. Hilton matrictulated at Finchley County School in 1928, gained his B.Sc. (London) in 1933 and his Ph.D. two years later. In America in 1946 he took a leading part in developing the high-speed wind tunnel at Daingerfield. After his return, he gained his D.Sc. Recently, he took the G.C.E. examination at the same time as his 17-year old son, Anthony, after a course at Coventry Technical College to improve his French grammar.

At Armstrong Whitworth he has been responsible for much of the wind tunnel testing on Seaslug, the Royal Navy's ship-to-air guided weapon, and has done a great deal of research into the problem of the successful re-entry into the earth's atmosphere of a manned space vehicle.

The Lagging Luftwaffe

FEDERAL GERMANY'S ambitious programme of air force expansion is now well behind schedule in nearly all its many different aspects, ranging from aircraft and airfield procurement to personnel training. One of the most immediate results of this delay is that the R.A.F. element in Germany will have to continue many of its responsibilities, particularly for air defence, for considerably longer than had been envisaged in the 1957 White Paper.

It appears that both the Germans and the NATO planning staffs underestimated the effort required to catch up on military reorganization in Germany from its demise in 1945. Because of this long gap the Luftwaffe, for example, has either new trainees or ageing war veterans to man its squadrons, which are consequently suffering from a serious lack of experienced junior leaders.

There is no shortage of experience in the upper echelons. Practically all the brilliant wartime pilots, except those few disbarred by their Nazi records, have rejoined the new Luftwaffe in which they now hold key positions. Some, however, are finding that the tactical changes in air warfare since the days of World War II place them at something of a disadvantage among other NATO staff officers with continuous experience of current operational concepts.

Others have had the advantage of serving with first-line squadrons of the R.A.F. to bring them up to date, and among this number is the top-scoring German fighter pilot, Maj. Erich Hartmann. He claimed 352 victories against British, American

JUMPING TO IT.—A Scottish Aviation Twin Pioneer C.C. Mk. 1 of No. 21 Squadron, Transport Command, the first R.A.F. Unit to be equipped exclusively with this type, shows its STOL capabilities at Benson. Later this year, No. 21 Squadron (Sqn. Ldr. W. John Bishop, M.B.E.) is going to Kenya as part of the Strategic Reserve.

Photograph copyright "The Aeroplane and Astronautics"

and Russian aircraft in World War II, and now commands the first Luftwaffe Sabre 6 squadron, recently formed at Ahlhorn.

With Oldenburg, which houses the Sabre O.C.U., and Celle, Fassburg, Wahn and Wunstorf, Ahlhorn has been handed over by the R.A.F. to the Luftwaffe, but the latter service is still experiencing great difficulty in obtaining enough airfields. The Federal Government at Bonn has insufficient powers of requisition to obtain land, authority having been distributed among the Länder or provincial administrations, some of whom will not allow the development of any military airfields.

This is particularly true in the North-Rhine-Westphalia region, but Schleswig-Holstein has proved more amenable, which accounts for the relatively large numbers of airfields in that province. Several wartime Luftwaffe bases are being extended there, and the new or rebuilt airfields under construction include Leck, Eggebeck, Husum and Hohn. Schleswig-land is being used by Kriegsmarine squadrons, which also operate from Kiel-Holtenau, and, on its completion, are to operate from Nordholz.

Other airfields in N. Germany being built or extended for the Luftwaffe include Nordhorn, Hopsten, Achmer and Stade. The main operational base in that area is Norvenich, which houses two fighter-bomber wings of F-84Fs, but there is another first-line airfield at Wittmundshaven, besides several other training and transport bases in S. Germany.

The powerful radar stations of the R.A.F. in Germany, forming the northern sector of NATO's chain from Norway to Turkey, are to be handed over for Luftwaffe operation at some future date. Because of the lack of trained German personnel, however, these stations will continue to be partially manned by the R.A.F. for some time to come.

Expansion in Air Mapping

MERIDIAN AIRMAPS, LTD., of Shoreham Airport, Sussex, announcing their intention of entering the overseas air survey market (which includes airborne geophysics, geological and soil surveys), have appointed Robert H. Windsor as their manager for overseas projects.

Mr. Windsor served for 12 years (in three separate periods) in the Royal Air Force, including some seven years in Middle East and Mediterranean countries.

Between wars he qualified as a commercial pilot and ground engineer. After a spell as flying instructor in the early days of Airwork at Heston, his interests soon became fixed on aerial photography. After starting business in a modest way as owner, pilot, photographer and traveller he had opportunities of experimenting in various applications.

Business flourished for seven years until the outbreak of war. Experienced photo-interpreters were few and far between, in consequence Mr. Windsor quickly found his way into the appropriate section of H.Q. Bomber Command and served as photo-interpreter, mostly abroad, until the end of the War.

After the War Mr. Windsor joined Air Survey Co., then in process of expansion, where, inter alia, he set about interesting local authorities in the right use of air photography for development purposes, but it was not long before his duties took him abroad once again, notably in Persia, Iraq and North Africa.

In 10 years Meridian Airmaps have been steadily building up their business. Equipped with R.C.8 (Swiss) air cameras and the most modern plotting equipment, this company has recently formed an association with Le Grand Adsco and Site Investigation, Ltd. (subsidiaries of the Stone Platt Group), who provide a world-wide service in the fields of geophysics, geological and soil surveys.

Aero-engine Exports

TWENTY-EIGHT per cent. of the total aviation exports earned by the British aircraft industry since the end of the War has been accounted for by aero-engines. This figure, which represents £237 million, was announced recently.

Earnings for the first four months of this year were at a record level of £19.4 million—more than £1 million a week—which was 25% more than in the equivalent 1958 period.

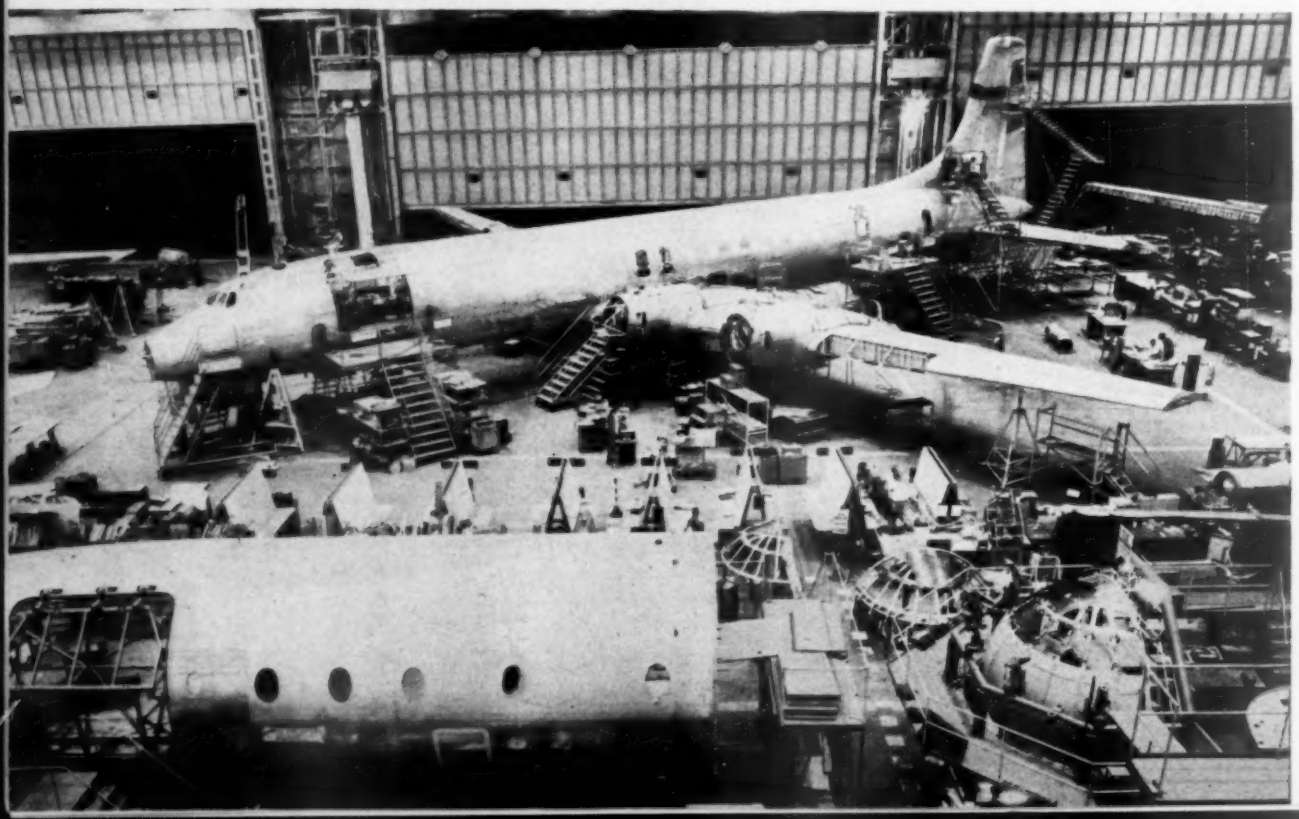
Current overseas earnings represent an annual total of around £58 million, which compares favourably with the 1958 record figure of £49.6 million. The figures do not consider royalties earned from the manufacturer of British aero-engines under licence abroad. Twenty-two such agreements, covering 12 engine types, have been signed with 12 countries since the War, and most are still in force.

More than 50 aircraft types of foreign design have British engines. Of the 1,400 turbojet and turboprop airliners now in service or on order, outside the Soviet bloc, no less than 61% are powered or will be powered by British engines. Great Britain, Holland and France have specified British engines exclusively for such aircraft, and 21% of the U.S. total, or 123 aircraft, are so powered.

Britannia 253s in Service

ON June 9 the first Britannia 253 for R.A.F. Transport Command was officially handed over to the Service at R.A.F. Lyneham. At an informal ceremony Mr. Cyril Uwins, deputy chairman, Bristol Aeroplane Co., presented the aircraft's

FUTURE FREIGHTER.—The first of eight Canadair CL-44Ds ordered by the R.C.A.F., seen nearing completion here, is to fly later this year. Powered by four Rolls-Royce Tynes, the CL-44D has been ordered also by the Flying Tiger Line and Seaboard and Western.



(XL636) log book to Wg. Cdr. J. O. Barnard, O.B.E., commanding officer of No. 99 Squadron, the Command's first squadron to be equipped with the new transport.

A total of 20 Britannia 253s are on order for Transport Command. Lyneham is to become the base for the two squadrons which are to operate them, together with the 10 Comet 2s of No. 216 Squadron. A new building programme has recently started at the station and within two years Lyneham is to become the most up-to-date military air transport terminus in this country.

Expecting to be in business with a full complement of crews and aircraft in about October, the aircraft of No. 99 Squadron are to supplement the Comets on the long-range transportation of freight and personnel. The Squadron's main operational task will be the rapid deployment of the U.K. strategic reserve in an overseas emergency, and other transport duties.

In the freight rôle the Britannia 253 has a cargo capacity of 5,859 cu. ft. and can carry a load of 15¼ tons; for casualty evacuation it can accommodate 53 stretcher cases with seating for six medical attendants; the passenger version can carry up to 117 troops in six-abreast rearward facing seats.

A Britannia Training Flight commanded by Sqn. Ldr. J. Owen, A.F.C., and containing three instruction teams, each of which consists of a complete crew, at present forms part of No. 99 Squadron. A number of crews are at present going through the training pipe-line and the Squadron expects to become fully operational in October.

A Pioneer Aeronaut

LT.-COL. THE HON. CLAUD M. P. BRABAZON, who died on May 14, was one of the few air officers with real all-round experience, both in peace and war, of all types of aircraft. He was born on July 16, 1874, the third son of the 12th Earl of Meath.

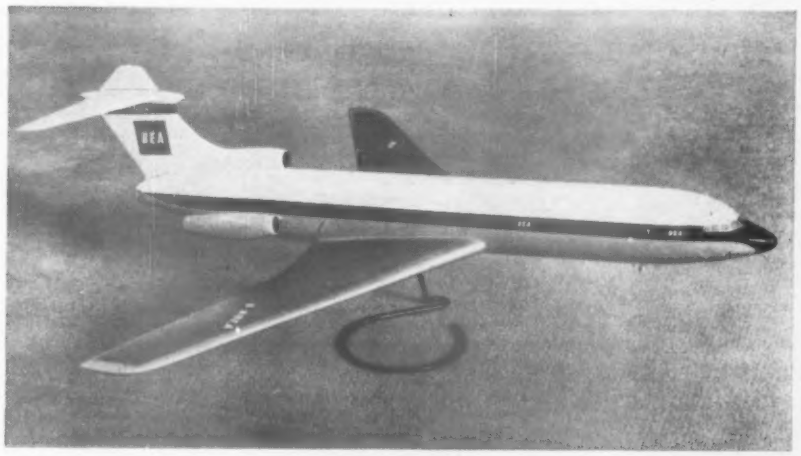
About 1906, after service in South Africa, he passed out of the Balloon School, R.E., and in the following year obtained Aeronaut's Certificate No. 7. From then on he was a keen and skilful amateur balloonist, taking part in the Gordon Bennett races of 1908 and 1922.

In 1912 he qualified as an aviator (Certificate No. 279) and then joined No. 1 Squadron, R.F.C., flying airships and kites. He qualified as an airship pilot, gaining Certificate No. 15 in January, 1913. During that year he was captain of H.M. Airships "Gamma" and "Eta."

He intended to retire when in January, 1914, the Army airships were transferred to the Naval Wing of the R.F.C., but was appointed to command the balloon and man-lifting kite detachment of the R.F.C. He went to France in August, 1914. Early the next year he transferred to the R.N.A.S. as a squadron commander for duty with the Kite Balloon Wing, and then took No. 2 Kite Balloon Section to France.

When in 1915 the kite balloons, having proved their use to artillery and staff, were taken over by the R.F.C., Brabazon was appointed to Naval airships. He commissioned the Mullion airship station and in July, 1917, succeeded Wing Captain Maitland as C.O. at Pulham, remaining there until being transferred to Howden, where all types of airship were based.

The D.H. 121



LAST week saw the end of the doubts and rumours about the much-discussed Airco D.H. 121 short-haul turbojet, when B.E.A. signed a contract for 24 of these aircraft with an option on 12 more. The final version of this vitally important British transport is smaller than that originally envisaged and is to be powered by three Rolls-Royce by-pass R.B.163s of 10,100-lb. thrust instead of the more powerful R.B.141s originally considered. Although the fuselage is shorter and the span is less than in earlier versions, the basic design concept remains unaltered, with aft-mounted powerplants.

The first D.H. 121 is due to fly in 1961, with deliveries to B.E.A. starting in the last quarter of 1963. The initial B.E.A. fleet will not necessarily be the first 24 off the production lines, but deliveries will be spread out between 1963 and 1965. There are two reasons for this delayed delivery schedule. The first is that Airco will need to be able to offer early dates to other prospective operators and it may well be that, if sales are as good as are hoped, B.E.A.'s fleet may form only a quarter or so of the total number of aircraft delivered by, say, mid-1965. The other is that the Corporation's traffic-increase expectations will not justify a too-rapid delivery rate, though it is assumed that nearly half the total B.E.A. traffic will be carried by D.H. 121s by 1967.

The final version of the D.H. 121 has been planned to suit the needs of other short-haul operators (using the term in the present-day sense for stage-distance requirements up to 1,000 miles or so) as well as revised ideas on the Corporation's own requirements. It is an "optimized" design, with capacity and stage-distance performance dictated by known requirements in the air transport industry, though a limited amount of "stretch," in terms of range, will be possible for special cases.

Detailed performance figures and graphs will be available for publication in the near future. For the present a good general idea of the capabilities of the aircraft can be obtained from figures given after the contract-signing ceremony at Keyline House on August 12. It will carry a maximum payload equivalent to 75 mixed-class or 90-plus economy-class passengers, with their baggage and fill-up cargo (say 17,000-19,000 lb.) over stage-distances up to about 1,000 naut. miles while needing, for take-off, at maximum weight (105,000 lb.) in normal temperature conditions, a runway length of no more than 6,000 ft. A maximum cruising speed of "more than" 520 knots (600 m.p.h.) is promised.

One of the problems for the designers of the smaller 121 has been the choice of powerplants while maintaining the agreed principle of "less than four but more than two." The earlier version was to have R.B.141s of about 12,000-lb. static thrust, but the thrust of this engine, now to be used in the Caravelle VII, is believed to have increased to 14,000 lb. or more. The R.B. 163s will provide a total thrust of 30,300 lb.—which is more like that needed for the gross weight of the smaller aircraft.

Nearly three years have passed since B.E.A. issued its specification for a short-haul turbojet in the autumn of 1956; approval was sought by the Corporation for the purchase of the D H. design in August, 1957. In order to meet the Government's wish for rationalization in the manufacturing industry and for confidence in the financial and other resources available for a private-venture project of this magnitude, a new company, the Aircraft Manufacturing Co., Ltd., (Airco), was formed. In this de Havilland have a 67½%, Hunting a 22½% and Fairey a 10% interest, with de Havilland carrying the design responsibilities. In February, 1958, B.E.A. was finally authorized to negotiate for the purchase of the D.H. 121.

Air Transport

The Turbofan Trend

THREE airlines—American, Qantas and K.L.M.—have now indicated their intention of using turbofan engines in part or all of their new jet fleets. Most significant of various recent announcements is that by American Airlines, who have completed arrangements for their entire Boeing 707 and 720 fleet to be turbofan powered by 1962. The airline has on order 25 707-120s and 25 720s, in addition to 25 Convair 600s to be built from scratch with General Electric CJ-805-23 turbofans.

Conversion of the 707-120s to have turbofans will begin next year, as soon as the Pratt & Whitney JT-3D-1 engines are available. These aircraft will be in service "in substantial numbers" by the first quarter of 1961 and will offer higher cruising speed, better economy and shorter take-offs than the 707 as at present in service. Ten of the smaller 720s will also be converted, and 15 will be delivered new with turbofans installed.

K.L.M. has confirmed an order for four more Douglas DC-8s, with JT-3D-2 turbofans, and the last aircraft of the original order for eight DC-8s will also be delivered with these engines.

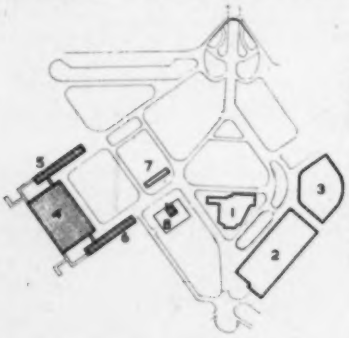
Qantas plans to re-engine its Boeing 707-138s with turbofans (presumably JT-3Ds) in or about 1961. Delivery of the seven Boeings to Qantas was delayed by a few weeks for power control equipment to be installed, as this is expected to be needed when the turbofans are fitted.

L.A.P.'s Long-Haul Building

WORK on the urgently needed long-haul building in the Central Area at London Airport is to start soon, to permit B.O.A.C. to begin operations there in the latter half of 1961. The M.T.C.A. has invited tenders for the foundation and steelwork contracts.

The design of the building, which will cater for up to 2½ million passengers a year, provides a central 2-storey block for passengers, linked by bridges to two 3-storey office blocks, with an enclosed court for parking cars and buses. Open-type construction is to be used, with movable partitions, to allow for future alterations.

It is intended to build a finger or pier from the building, but the Ministry notes that "further modification may be necessary in the light of experience" and initially coaches may be used between aircraft and terminal. Most long-haul aircraft will operate from the S.W. apron, where the majority of standings are very close to the site of the new building.



Position of the new long-haul building at L.A.P. is shown here as item 4, with office blocks at 5 and 6. Item 8 is a new central heating station. Existing buildings are the control tower, 1; S.E. passenger building, 2; Queen's building, 3; and aviation fuel depot, 7.

The new terminal, which will include two restaurants, will cater for the simultaneous arrival of up to five large aircraft. Baggage flow will be in a straight line, on the ground floor, between the front and back of the building.

Hercules for the Airlines

PAN AMERICAN'S order for 12 Lockheed GL-207 Super Hercules freighters is significant not only in relation to the aircraft, which now moves into effective sales competition with the Canadair CL-44, but also because it shows this airline's growing interest in the freight market. Like most of the other major U.S. airlines, Pan American has been running all-freight services with older piston-engine types and will convert many of its DC-7Cs to this role pending delivery of the GL-207s early in 1962. It is, however, the first large operator of passenger services to order modern freight aircraft.

News of the Pan American order came quickly after Slick Airways had become the first civil operator to order the GL-207, with a contract for six, also for delivery in 1962. Pan American has ordered a long-range version for transatlantic operation with a 70,000-lb. payload.

SHORT-HAUL JET.—The first B.E.A. Comet 4B, which flew on June 27. B.E.A. has increased its order to seven, and the second of these was to fly this week, by which time the first had flown for 100 hours; in addition, Olympic Airways has ordered two Comet 4Bs (see page 42). Certification is expected by the end of September with deliveries starting in October.

The GL-207 Super Hercules, based on the C-130B in production for the U.S.A.F., has a gross weight of 230,000 lb. and is powered by four Allison 550-B1 (military T61) turboprops. Preliminary details were given in THE AEROPLANE AND ASTRONAUTICS for April 24. Gross usable volume of the freight hold is over 7,500 cu. ft. and maximum payload on a non-stop transcontinental operation will be 77,000 lb.

Slick Airways is one of the pioneer American air freight carriers, but in 1958 suspended scheduled operations. All the major U.S. freight airlines have now ordered new turboprop equipment: Flying Tiger and Seaboard and Western placed contracts for fleets (10 and five respectively) of Canadair CL-44Ds earlier this year, and Riddle Airlines has provisionally ordered four A.W. Argosies.

In Support of Cheap Fares

THE Air League has called upon the Government to take action to reduce air fares. A committee set up to consider the question of cheaper air fares has reached the conclusion that fares could be cut immediately on many routes if action were taken now.

The policy which the Air League is advocating firmly supports fare differentials, with cheap fares offered immediately in some of the older types of aircraft which are now fully depreciated, and in future in new aircraft developed primarily for the low-fare market. The committee believe that fares of 3d.-4d. per passenger-mile are possible today and would allow a 10% profit on turnover with load factors of about 70% over suitable routes. Fares of 2d. per passenger-mile are considered feasible within the next decade, assuming the development of large (100-passenger) turbofan-powered transports, used by a low-overhead airline on routes with plenty of traffic.

The committee comprised Sir Archibald Hope (chairman), Mr. Peter Masefield, Gp. Capt. Douglas Bader and Mr. P. Ll. Hunting.

Common Sense at San Diego

AMONG the decisions taken by the 12th annual I.C.A.O. Assembly, at San Diego, California, in June and July, was one of particular significance to the future operation of supersonic aircraft. Originally introduced by the U.K. delegation, the proposal, that a full-scale study of the prospects and implications of supersonic transports should be undertaken immediately, was adopted in the face of some powerful opposition.

The study which the I.C.A.O. Council has been instructed to undertake, with a view to issuing a report before September 30, 1960, will assess the chief probable technical, economic and social consequences of introducing supersonic transports into service in the period 1965-1975, and will comment particularly on the investment and amortization problems of governments, airlines and airport authorities, as well as the probable noise, land-use and other similar social problems.

In the form adopted, the resolution was put forward by the U.K., Australia, Belgium, Denmark and Germany. Under pressure from the U.S., this proposal was later toned down by the U.K. delegation but was reinstated by a majority vote

(18 to 10) of the Executive Committee and was then adopted by the Assembly.

The U.S delegation took the view that the proposed study might lead to the creation of formal standards for field length, noise generation and other factors, which, in effect, would amount to design requirements. The U.K. view was that the unexpected and rapid introduction of the first generation jet transports had caused confusion and dissatisfaction and that the study would help to avoid a repetition of the difficulties being experienced.

Among other decisions of the Assembly was one calling for the joint financing by user-nations of air navigation services and facilities needed for jet operations in countries unable to finance these themselves. The continuing need for better co-operation and co-ordination of the joint civil and military use of airspace was also stressed.

The new Council of I.C.A.O., to serve for three years, comprises Argentina, Australia, Brazil, Canada, Denmark, France, Germany, Guatemala, India, Italy, Japan, Lebanon, Netherlands, Philippines, Portugal, Spain, South Africa, United Arab Republic, the U.K., U.S.A. and Venezuela. Mr. Walter Binaghi was re-elected president of the Council and Mr. R. M. Macdonnell has succeeded Mr. Carl Ljungberg as secretary-general.

Intercontinental Certification

AN F.A.A. type certificate was awarded to the Boeing 707-320 Intercontinental on July 15, five months to the day after flight testing of the Intercontinental began, and the first delivery of this type was made on July 19 to Pan American. Two aircraft—both destined for Pan American—flew a total of 401 hours by the end of June, of which 166 hours were devoted to actual F.A.A. flights. Maximum take-off weight demonstrated was 315,000 lb., which will be the weight of later versions, with increased fuel capacity. The initial certificated weight is 302,000 lb. The 707-320s are powered by 15,800 lb.s.t. JT-4A-5 turbojets.

The F.A.A. testing included 52 hr. 30 min. of long-range functional and reliability tests. About half of the period was taken up with a visit to Europe, including non-stop Seattle-Rome and London-Seattle flights in May.

	Distance st. mi.	Time hr. min.	Av. Speed m.p.h.	Max. Alt. ft.	T.O. Wt. lb.
Seattle-Rome	5,800	11 6	525	39,000	285,160
Rome-Paris ..	726	1 34	463	26,600	199,500
Paris-Brussels	176	33	320	21,000	209,000
Brussels-Frankfurt ..	217	39	335	17,000	200,000
Frankfurt-London ..	475	1 6	432	26,600	182,000
London-Seattle	4,828	9 38	500	41,000	281,000

Details of these flights have been tabulated by Boeing and give an indication of the kind of performance possible with the Intercontinental (see above). On the flight from Seattle to Rome, the average tail wind component was 20 knots. Maximum true airspeed was 477 knots and max. cruising Mach number was 0.802. Max. Mach number on the London-Seattle leg was 0.79. With the nine-hour difference between British Summer Time and Pacific Summer Time, the 707-320 landed at Seattle only 38 minutes, local time, after leaving London.

The Southall Accident Report

THE succession of immediate events which led to the crash of the Independent Air Travel Viking, G-AIJE, at Southall on September 2, 1958, can be summarized as follows:—

An oil leak showed itself in the starboard engine when south-east of the Dunsfold range on the first, London-Nice stage of a flight to Lod with two Proteus engines for El Al. The engine was throttled and the aircraft turned back for an emergency landing at Blackbushe. Over Dunsfold the engine was feathered.

Because an ADF was incorrectly tuned (probably to the powerful Amsterdam beacon operating on a similar frequency) the flight continued on an N.N.E. (and later on an E.N.E.) heading instead of a N.W. heading towards Blackbushe. When, after passing the Epsom range, a QDM was obtained from Blackbushe, a turn on to a westerly heading was completed, but altitude had been lost and, because of a burnt-out actuator, the starboard propeller could not be unfeathered. Thereafter the aircraft descended to 400 ft. and virtually took control, with a partially corrected gradual turn into the dead engine, before the crash.

The Public Inquiry found that there were serious deficiencies in the manner in which the maintenance was done and that the aircraft was overloaded on take-off to the extent of about 900 lb. Although this fact would not have had a serious effect on the performance, it probably increased the captain's anxieties and his difficulties in the final crisis. It was considered, too, that the captain was suffering from fatigue, since he had had much less than the specified amounts of rest between duty periods during the preceding three days.

The finally pertinent questions—of cause and contributory default—were answered thus:—

1. The aircraft was allowed to lose height and flying speed, with the result that the pilot was no longer able to exercise asymmetric control. To this was added a qualifying sentence to the effect that the evidence warranted a finding that the true cause was the outcome of a chain of circumstances.

2. The pilot ought never to have taken off in this aircraft which to his knowledge, was overloaded and with a crew which he must have known were not of proved competence and at a time when he himself was suffering from fatigue. He may or may not have known in addition that it had not been properly maintained. The manner in which he handled it, particularly in following the wrong course and losing height and flying speed, must have contributed to the accident.

The conduct of the pilot and the whole course of events detailed in the report were, in the Commissioner's opinion, contributed to by the deliberate policy of the operating company, which was to keep its aircraft in the air and gainfully employed regardless of the regulations or of the elementary requirements which should enjoin consideration for the conditions of working of its employees or the maintenance of its aircraft.

The Commissioner agreed with the Air Registration Board that, with a company so organized and with such an attitude to its responsibilities, it is perhaps only surprising that an accident such as this did not occur before. In his judgment any responsibility of Capt. Mayger was to be viewed in the light of his position as an employee upon whose shoulders an intolerable burden was placed.

TRICOLOUR VANGUARD.—The third Vickers Vanguard, flown from Weybridge on July 23, is the first to sport the new red, black and white B.E.A. colour scheme, and also displays in this photograph the new dorsal fin. The three Vanguards have now amassed nearly 400 hours.

Canadian Sub.-Killer

SINCE the handing over of the first Canadair CL-28 Argus to the R.C.A.F. Maritime Air Command (A.O.C., Air Cdre. W. I. Clements, O.B.E.), on April 30 of last year, more than 15 of these long-range maritime-reconnaissance aircraft have been delivered to the Service. The total R.C.A.F. order is for 33 aircraft (13 Mk. 1s and 20 Mk. 2s) of which 26 are to be produced by the end of this year and the contract completed by July, 1960.

One Maritime Air Command squadron—No. 405 at Greenwood, Novia Scotia—has been fully re-equipped with the Argus and a second squadron—No. 404—is in the process of changing over from Neptunes. No. 405 Squadron has 13 crews of 15, consisting of three pilots, three navigators, two flight engineers and seven electronic equipment operators, and is divided into two flights together with training and tactics teams.

The design requirements for the Argus take account of the fact that although the short-based aircraft proved to be an effective anti-submarine vehicle during the Second World War, it had limitations as a complete weapons system for use against snorkel-equipped nuclear-powered submarines. Important limitations were the lack of range; the lack of detection equipment to locate submarines once they had submerged; and the lack of weapons to ensure a high percentage of kills on submerged submarines.

The overcoming of these limitations led to the development of the Argus utilizing the principal structural and aerodynamic features of the Bristol Britannia 100 and 300 transports. The Britannia's Proteus turboprops have been replaced by four Wright-type 981 turbo-compound radial piston engines, each developing a take-off rating of 3,700 b.h.p. with water injection and driving Curtiss Wright propellers. This change in powerplants was made to obtain a low specific fuel consumption at the low altitude (1,000 ft. or lower) and slow speed loitering (normally 165 knots) required for anti-submarine patrols.

Design features incorporated in the Argus for the maritime rôle include an observation and bomb aimer's position in the transparent nose blister; a large flight deck layout for the normal flight crew of captain, co-pilot, flight engineer, navigator and radio operator; a main compartment amidships containing the tactical operational stations and equipment; an aft compartment with two beam watch stations, stowage and dispensers for sonobuoys, pyrotechnics and other equipment; and a rest area between the flight deck and the amidships compartment.

The magnetically inert tail boom provides for the carriage of magnetic detection equipment. Two 18-ft. bomb bays in the centre fuselage are each capable of carrying 4,000 lb. of armament stores, including active and passive homing torpedoes, nuclear and conventional depth charges and bombs. In addition, beneath the wings outboard of the outer engines two air-to-surface missiles can be carried up to a maximum weight of 3,800 lb. each, such as Petrel, an air-to-underwater weapon.

Navigation and Detection Equipment

The Bendix Eclipse-Pioneer PB-20C automatic flight control system with close-tolerance altitude retention is standard equipment in the Argus, together with ANTAC (Air Navigation and Tactical Control system), LORAN, dual radio compasses and provision for TACAN. ANTAC provides continuous corrected track and course data for normal navigation; ground position and instrument presentations designed for maritime use and, through linkages to the radio navigational aids, a number of bearing references to the pilot.

Communications equipment for use by the aircraft operating crew includes a duplicated HF command transceiver, a VHF set and provision for a UHF set. Developments in external antennae on the Argus include an electronic isolated upper fin HF antenna.

Tactical equipment consists of electronic countermeasures radar (ECM); nose search radar (one of the differences between the Mk. 1 and Mk. 2 Argus is the reduction in the size of installation brought about by the change from American to British equipment); the magnetic anomaly detector (MAD) in the tail cone; sonobuoys; and Julie—explosive echo ranging.

The first-mentioned equipment, ECM, is capable of analysing detected radar transmissions operating in the area of the Argus to determine their specific frequency as well as the bearing of the emitting source from the aircraft. MAD detects the disturbances in the Earth's magnetic field caused by the presence of a submarine. It is employed to locate and fix a craft on the surface. Sonobuoys are used for underwater submarine detection through engine noises. Employing small explosive charges set off in the water, the Julie technique is used in conjunction with sonobuoys to detect submarines that have stopped their motors.

With full internal fuel and oil the Argus has a gross weight of 148,000 lb., a usable fuel capacity of 6,688 Imp. gal. and auxiliary fuel provision of 500 Imp. gal. Its empty weight is 81,000 lb. and maximum landing weight is 123,000 lb.

Patrolling at 165 knots (E.A.S.) at sea level and allowing for a 500-n. mile diversion on return to base, the Argus has a patrol time of 12 hr. at a range of 720 n. miles. At 1,050 n. miles the patrol time is 8 hr. and at 1,380 n. miles range it is 4 hr. These figures are considered to be on the conservative side and based on a cruise speed of 180 knots (E.A.S.) to and from the patrol area at an altitude of 5,000 ft.—P.R.R.

Photograph copyright "The Aeroplane and Astronautics"

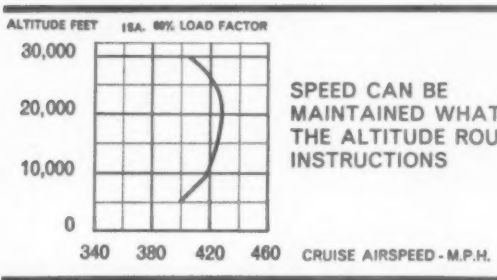
A R.C.A.F. Argus of No. 405 Squadron at R.A.F. Northolt during a recent week's visit of three aircraft to the United Kingdom. Crews also took part in trials at the Joint Anti-Submarine School, Londonderry.

Only the VANGUARD
has this proved flexibility

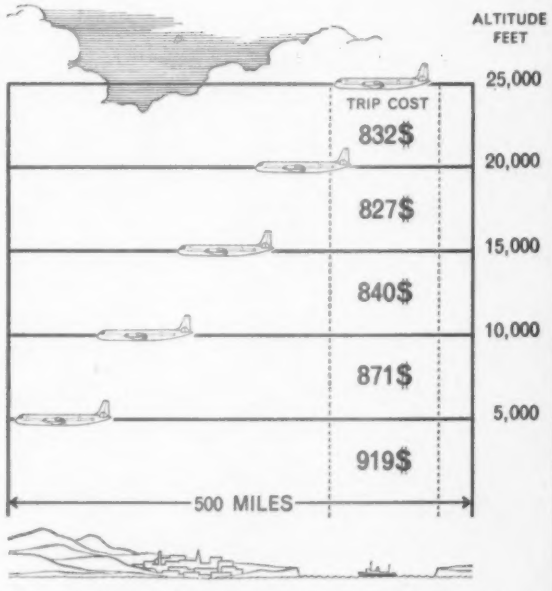
AIRLINE OPERATORS are invited to look carefully at this diagram and graph, and then compare the Vanguard's flexibility with their own experience of short haul operation on high-density routes.

It is easy to see that this remarkable aircraft can be routed at altitudes of from 5,000 ft to 25,000 ft and above, with practically no penalties in operating costs or speed.

The difference in direct cost between a 500-mile sector flown at 10,000 ft and one flown at an optimum of 20,000 ft is only $44 per trip. A cruising speed of over 400 m.p.h. is available between the height bands of 5,000 ft and 30,000 ft., so that schedules can be maintained irrespective of routeing instructions.



SPEED CAN BE MAINTAINED WHATEVER THE ALTITUDE ROUTEING INSTRUCTIONS



LOW LEVEL ROUTEING IMPOSES NO FINANCIAL STRAIN WITH THE VANGUARD

Of all the airliners only the Vanguard has all these features

425 m.p.h. cruising • Freight capacity 10 tons at normal densities • Full routeing and A.T.C. flexibility • Can use normal existing airfields • Quick turn-round • No airfield noise problems • Ten years' unique Vickers/Rolls-Royce turbo-prop experience . . . ***And it is 'Viscount' quiet.***

VICKERS VANGUARD

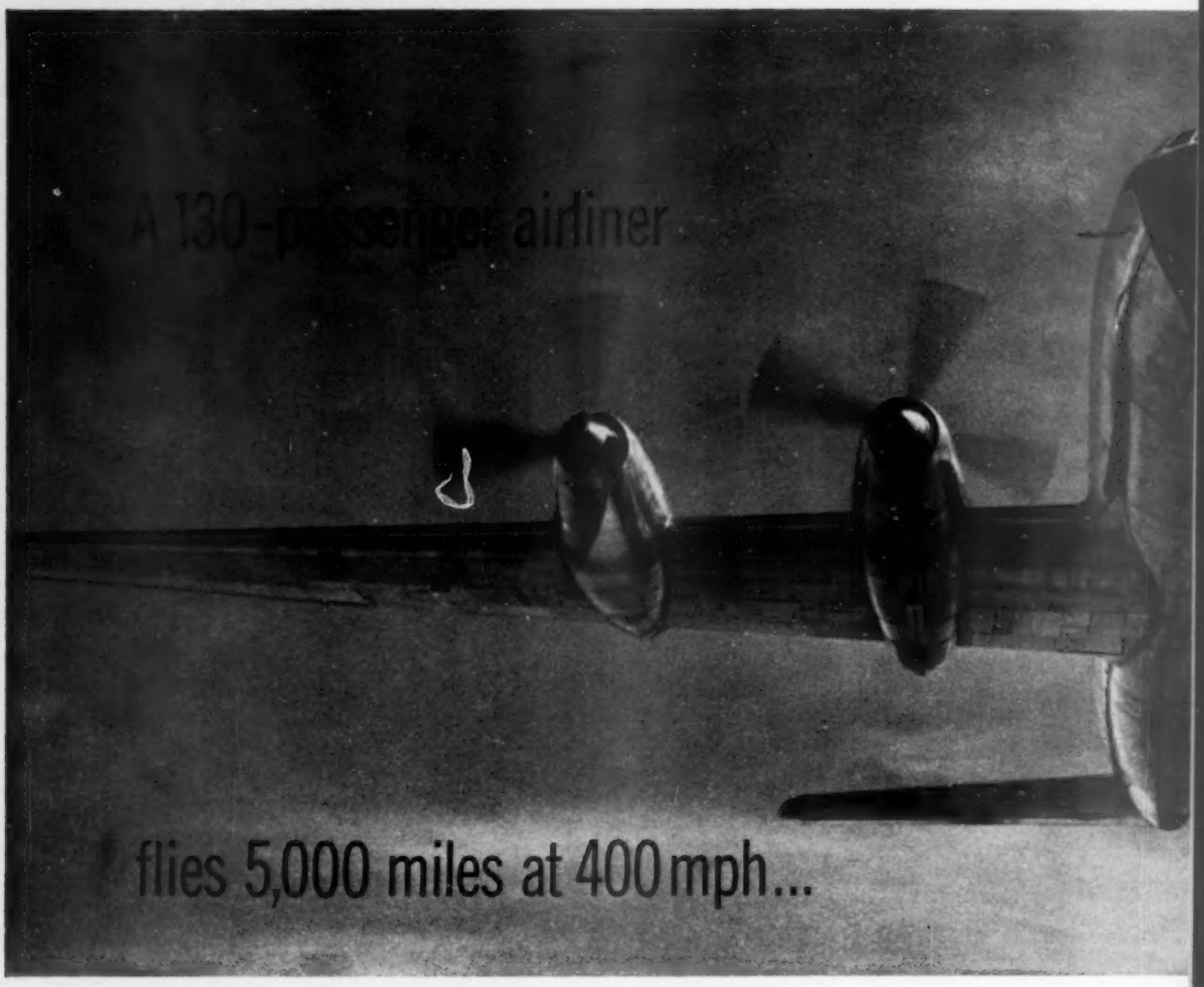
FOUR ROLLS-ROYCE TYNE TURBO-PROP ENGINES

• ***The airliner with the biggest profit potential ever offered to the operator***

VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED WEYBRIDGE SURREY

AT 626

C

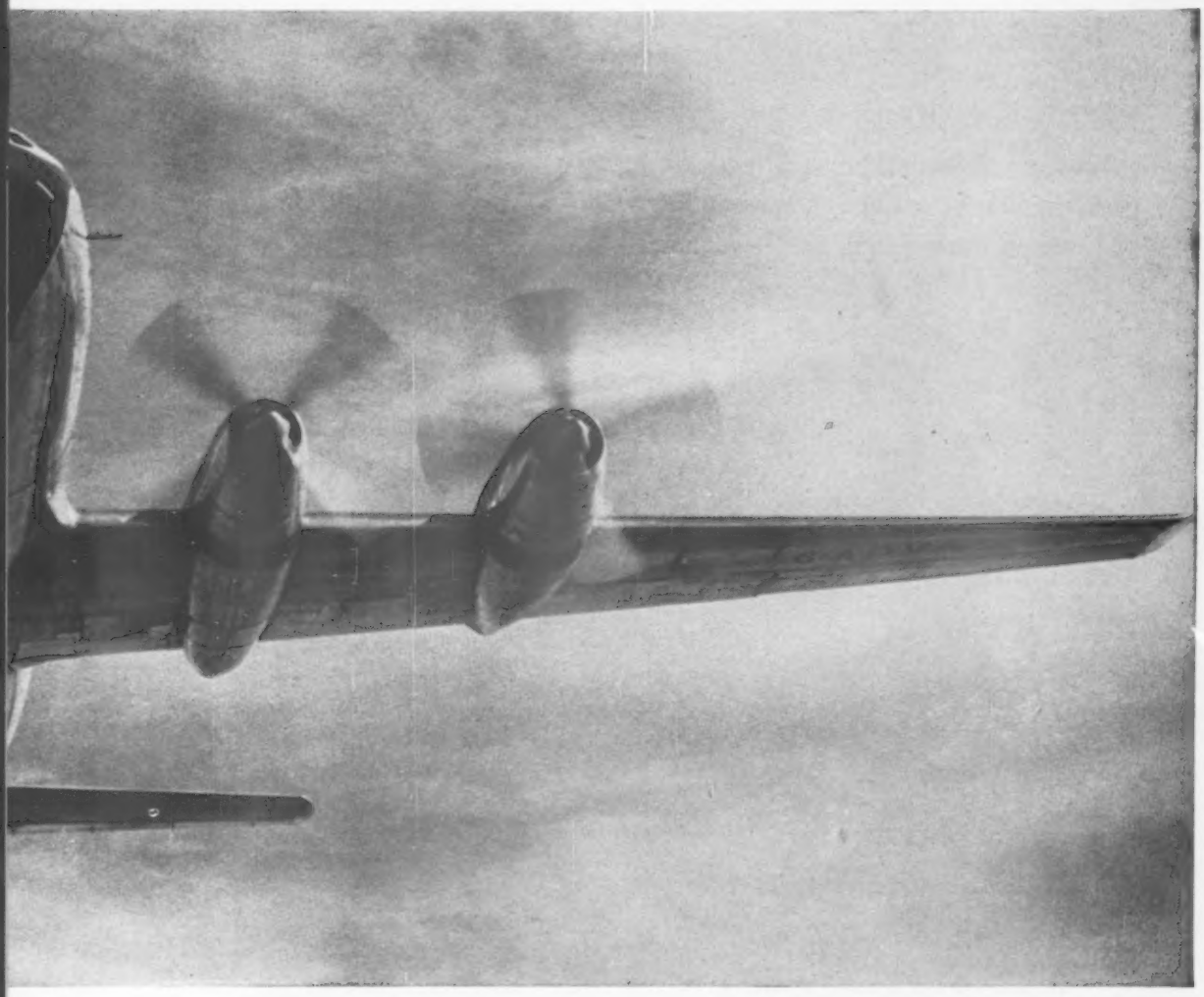


...AND BRISTOL SIDDELEY

One of the largest manufacturers of motive power units in the world, Bristol Siddeley Engines Limited produce the Proteus.

A turboprop in the 4,000-hp class, the Proteus powers the Britannia airliner, in service with RAF Transport Command and ten airlines all over the world. The Proteus is perhaps the most dependable engine in the air today. It reached an overhaul period of 2,000 hours in under two years—a rate of increase never before achieved by any other engine, piston or gas turbine. Proteus derivatives have been designed for use as turbo-generator power plants and as marine turbines.

BRISTOL SIDDELEY ENGINES LIMITED



SUPPLY THE POWER

TWO BRISTOL SIDDELEY MAYBACH diesels power this British Railways diesel hydraulic locomotive—develop a total of 2,200 hp. A large number of Maybach diesel engines have been ordered by British Railways alone.

THE BRISTOL SIDDELEY GAMMA rocket engine powers the Saunders-Roe Black Knight—Britain's highly successful space research vehicle. The Gamma for a dry weight of only 700 lb—sends Black Knight 500 miles up into space.

THE BRISTOL SIDDELEY MARINE PROTEUS powers the world's fastest naval vessels, the "Brave" class Royal Navy patrol boats, built by **Vosper Ltd.** Three Proteus deliver a total of **10,500 hp** —give these boats a speed of over **50 knots.**

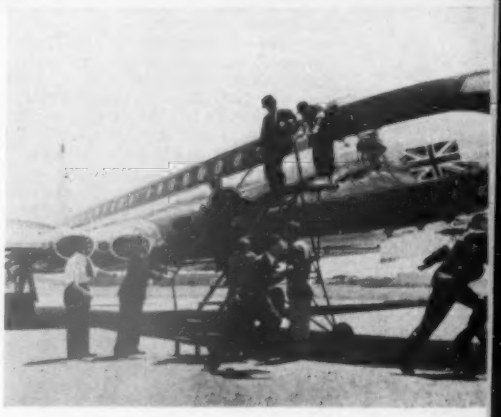
. . . so I looked her straight in the eye and said:
"With fuel temperatures approaching minus 50° Centigrade at today's operating altitudes the problem of pumpability is a factor to be reckoned with. But AIR BP have established positively that BP aviation fuels retain full fluidity when temperatures sink to even lower levels."

You being personal, old man?

THE AVIATION SERVICE OF BRITISH PETROLEUM

H. A. Taylor

Analyses the *Daily Mail* Race



BEATING IT.—Above, Sqn. Ldr. C. G. Maughan at Biggin Hill. Right, BEAline Syndicate at Le Bourget.

THERE were two especially interesting features in the results of last month's *Daily Mail* race—and one curiosity to be thought about. The first of these was the way in which determined, active and practised competitors, with well-organized support, could cut their centre-to-centre times down to figures which, with 10 minutes or more of ground-travel to be included, had previously been thought impossible. The second was the difference made to the times of relatively normal journeys when processing is virtually non-existent and when travellers and operators are prepared to cut the usual time-margins to an absolute and normally impracticable minimum. The curiosity was that all but one of the eight fastest times were made in the Paris-London direction.

Given initial selection of the fastest vehicles, the shortest routes and planned time-saving methods, the results showed that as much as five minutes could be saved by time-and-motion study. The winner of the speed race, Sqn. Ldr. Maughan, and the third-placer, Gp. Capt. Ryder, made six attempts each. With one or two exceptions they cut their times down steadily from 44 min. 35 sec. to 40 min. 44 sec. and from 47 min. 45 sec. to 42 min. 6 sec. respectively. The second-placer, Mr. Rylands, made four attempts, improving from 45 min. 9 sec. to 41 min. 41 sec.—though his last run was not, in fact, his best.

The times in the speed class were extraordinarily low in the circumstances of the race. Even the promoters had not expected anyone to beat the time for THE AEROPLANE's 1948 Hare and Tortoise effort, which had been a much simpler operation involving no appreciable surface travelling, the use of chosen helicopter points for the start and finish and the conveyance of a letter rather than a body between the two centres. Maybe no one had thought it possible, for instance, that a motorcycle could cover the four miles between the Arc de Triomphe and Issy in four minutes or less.

The Hare and Tortoise time—46 min. 44½ sec.—was, in fact, cracked on the third day by the R.A.F. team and by the end of the period 12 competitors had improved upon it in the course of 31 sorties, not including those for which the times were disallowed. Altogether, 47 attempts were successfully completed in less than an hour, 18 by civilians and two by personal entries; four competitors, in seven sorties, managed to beat 43 minutes.

For a civilian, and no youngster, with a civil organization competing against Service teams, Mr. Rylands' performance was quite outstanding. Admittedly he had the use of a very fast aircraft flown by an experienced test pilot for the Channel section of the journey. One simple little trick was the use of a manually mounted "ramp" for entering the two-seat Hunter T.66. No less remarkable, in its own way, was the performance of Cdr. Martin, who necessarily flew solo in a Scimitar, with all that this entailed.

So much for the "tigers." More practical lessons may be learned from the bowler-hatted brigade, led by the prize-winning BEAline Syndicate, and from other competitors using normally available means of transport. In fact, neither the Syndicate nor the extraordinarily fast Renault team members can be considered to have been bowler-hatted in the fullest sense. The Syndicate used a transport aircraft which is not in service or available for charter, and the Renault team used a jet bomber for the fastest run and, for the others, a four-seat communications turbojet *(see p. 32)* which is not yet in the normally available-for-charter executive-aircraft class.

But, if the M.S. Paris is counted as a normal transport medium, the Renault team was way ahead among the bowler-hatted brigade, with six entrants beating the hour and a best time of 55 min. 9 sec. Had special prizes been offered for genuine commercial attempts the overall results might have been different. The fastest user of a scheduled air service was Mr. Ripley, but his bowler hat would not have stayed on during his motorcycle rides and any imaginary prize in this section might, therefore, have gone to M. Lestourneaud, who proceeded

Approx. Breakdown of Sqn. Ldr. Maughan's Times

Stage	Method	Time	
		min.	sec
Arc de Triomphe-Issy	Motorcycle	4	0
Change-over	—		12
Issy-Villacoublay	Sycamore	3	44
Change-over and Customs ..	—		7
Villacoublay-Biggin	Hunter T.7	18	28
Change-over and Customs ..	—		5
Biggin-Chelsea Embankment ..	Sycamore	7	30
Change-over	—		8
Chelsea-Marble Arch	Motorcycle	6	30
	Total Time	40	44

BEAline Syndicate Times

Stage	Method	Time	
		min.	sec.
Check-out (last competitor) to bus away			33
Marble Arch-Paddington Station	L.T. double-decker bus	3	00
Bus to train			20
Paddington Station—Ruislip Gardens Station	B.R. diesel train	12	40
Ruislip Gardens Station—Aircraft on runway	Crew cars	1	20
Northolt—Le Bourget	Comet 4B (G-APMA)	28	30
Aircraft to taxis		1	30
Le Bourget—Arc de Triomphe ..	Four taxis	13	15
Taxi to check-in (first competitor)			8
	Total time (fastest man)	61	16
	Average team time	62	15

1948 Hare and Tortoise Times

Stage	Distance	Method	Time
	st. m.		min. sec.
St. Paul's-Biggin Hill ..	15	Bristol 171	9 35
Hand-over ..	—	—	49½
Biggin Hill-Orly	214	Meteor 7	27 38
Hand-over	—	—	12
Orly-Les Invalides ..	8.25	Westland-Sikorsky S-51	8 30½
		Total time	46 44½

The "Daily Mail" Race . . . .

fairly normally by car to and from Orly and L.A.P. to clock 1 hr. 40 min. 41 sec. The fastest time using civil aircraft was Mr. Laver's 51 min. 19 sec. on his solo return run after the BEAline team trip to Paris—but he would also have lost his bowler hat (and his umbrella) when jumping from his helicopter into a rubber dinghy—and business travellers would not normally be able to call on the services of amateur frogmen.

The Syndicate certainly deserved the prize if only because its programme pointed a way to better things for the normal air traveller—with its use of the unimpeded train to get out of a crowded city and of an aerodrome which is probably more easily reached than any other in the London area. With everyone entering into the spirit of the affair, the Syndicate's performance was a *raid* in the most splendid tradition. The chartered British Railways' diesel train operating a special service from Paddington to Ruislip Gardens seems to have averaged something over a mile a minute; formalities were negligible; the Comet 4B was flown right up against its max. diving speed (cruising at M=0.82, or 580 m.p.h. true at 23,000 ft.); and the members of the Syndicate are never likely to forget their 13-minute taxi rides from Le Bourget to the Arc.

This one-off, 13-passenger dash showed what could be done and leads one to thoughts about the prospects of a 90-minute train-air journey through Gatwick and Orly when the latter's proposed railway spur is completed.

Nevertheless, we should not harbour false ideas about inter-city times which are practically possible in more normal conditions. Passengers and airlines must necessarily allow "cushion" intervals at the processing points and, unless the number of airline staff (and of their desks) equal the number of passengers passing through, there must inevitably be delays and allowances must be made for these delays. The results of the *Daily Mail* race point the way to improved terminal organization and to the prospects of getting the centre-to-centre times down to a more reasonable figure.

R. F. Laver of the BEAline Syndicate saving time on the return trip at Westminster.

Competitor	Best time	Channel crossing aircraft	Additional transport means and route (P—from Paris)	Remarks
	h. m. s.			
Sqn. Ldr. C. G. Maughan ..	0 40 44	Hunter T.7	P M/c to Issy, Sycamore to Villacoublay and from Biggin, m/c from Chelsea Embankment.	R.A.F. team. Best of six attempts.
J. E. Rylands	0 41 41	Hunter T.66A ..	M/c to Heliport, Widgeon to Biggin and from Villacoublay, m/c from Issy.	Fastest civilian. Best of four attempts. Skyways entry.
Gp. Capt. E. N. Ryder ..	0 42 6	Hunter T.7	P. M/c to Issy, Sycamore to Villacoublay and from Biggin, m/c from Chelsea Embankment.	R.A.F. team. Best of six attempts.
O/C J. F. C. Volkers ..	0 42 34	Hunter T.7	P. M/c to Issy, Sycamore to Villacoublay and from Biggin, m/c from Chelsea Embankment.	R.A.F. team.
Lt. Cdr. W. J. Carter ..	0 43 9	Sea Vixen	P. M/c to Issy, Whirlwind to Villacoublay and from Wisley, boat and m/c from Chelsea Reach.	R.N. entry.
Cdr. I. H. F. Martin ..	0 43 11	Scimitar	P. Car to Issy, Whirlwind to Villacoublay and from Wisley, boat and m/c from Chelsea Reach.	R.N. entry. Fastest self-pilot.
Lt. J. Westlake	0 43 32	Hunter T.7	P. M/c to Issy, Sycamore to Villacoublay, Whirlwind from Biggin, m/c from Chelsea Embankment.	Royal Corps of Signals entry, R.A.F. Hunter.
Lt. S. R. C. Bemrose ..	0 44 5	Hunter T.8	M/c to Heliport, Widgeon to Biggin and from Villacoublay, car from Issy.	Royal Marines entry.
Fl. Lt. M. J. Williams ..	0 44 6	Hunter T.7	M/c to Chelsea Embankment, Sycamore to Biggin and from Villacoublay, m/c from Issy.	R.A.F. team.
Mlle C. Duval	0 44 40	Vautour	M/c to Heliport, Alouette to Biggin and from Villacoublay, M/c from Issy.	
J. le Bailly	0 45 43	Vautour	Dauphine to Heliport, Alouette to Biggin and from Villacoublay, Dauphine from Issy.	Renault/Sud entry.
Capt. F. St. C. Robinson ..	0 46 22	Hunter T.7	M/c to Chelsea Embankment, Whirlwind to Biggin, Sycamore from Villacoublay, m/c from Issy.	Royal Corps of Signals entry, R.A.F. Hunter.
P. Laureys	0 47 21	Vautour	P. M/c to Issy, Alouette to Villacoublay and from Biggin, m/c from Heliport.	French aviation journal entry.
R. F. Laver	0 51 19	Comet 4B	P. M/c to Issy, Alouette to Villacoublay, Bell 47J from Biggin, dinghy and m/c from Westminster.	Member of BEAline Syndicate. Solo speed attempt.
†P. A. Auerbach	0 55 9	M. S. Paris	Dauphine to Heliport, Alouette to Biggin and from Villacoublay, Dauphine from Issy.	Prize for fastest user of personal transport with light executive turbojet. Renault/Saulnier team.
Lt. B. P. Lynch	0 57 3	Hunter T.7	M/c to Heliport, Whirlwind to Biggin, Sycamore from Villacoublay, car and m/c from Issy.	Royal Corps of Signals entry. R.A.F. Hunter.
†K. B. Neely	0 57 28	Meteor 11	P. M/c to Villacoublay, Alouette from Biggin, foot and m/c from Hungerford Bridge.	Prize for ingenuity and demonstrating high-level heliport.
J. Vinatier	0 57 34	M. S. Paris	Dauphine to Heliport, Alouette to Biggin and from Villacoublay, Dauphine from Issy.	Renault/Saulnier team.
G. A. Hannagan	0 57 43	M. S. Paris	Dauphine to Heliport, Alouette to Biggin and from Villacoublay, Dauphine from Issy.	Renault/Saulnier team.
P. Arrighi	0 57 49	M. S. Paris	P. Car to Issy, Alouette to Villacoublay and from Biggin, car from Heliport.	
†Capt. R. M. B. Walker ..	0 57 47	Jet Provost	M/c to Chelsea, boat to pontoon, Skeeter to Biggin, Widgeon from Villacoublay, m/c from Issy.	Prize for personal dash.
M. Trintignant	0 58 2	M. S. Paris	Dauphine to Heliport, Alouette to Biggin and from Villacoublay, Dauphine from Issy.	Renault/Saulnier team.
G. de Caunes	0 59 21	M. S. Paris	Dauphine to Heliport, Alouette to Biggin and from Villacoublay, Dauphine from Issy.	Renault/Saulnier team.
F. Clerc	1 0 7	M. S. Paris	P. Dauphine to Issy, Alouette to Villacoublay and from Biggin, Dauphine from Heliport.	Renault/Saulnier team.
*P. W. Brooks	1 1 16	Comet 4B	L.T. bus to Paddington, B.R. train to Ruislip Gardens, car to Northolt, taxi from Le Bourget.	Fastest of 13-man BEAline Syndicate, winners of prize for originality, ingenuity and initiative.
J. Hugenholtz	1 1 25	Fokker S.14	Car to Northolt and from Le Bourget.	
†W. E. Butlin	1 1 33	Spitfire T.8	P. Car to Issy, helicopter to Villacoublay and from Biggin, boat and car from Thames.	Prize for initiative and use of helicopter landing pontoon.
P. Guerin	1 1 47	M. S. Paris	P. Dauphine to Issy, Alouette to Villacoublay and from Biggin, Dauphine from Heliport.	Renault/Saulnier team.
J. Limone	1 1 48	M.S. Paris	P. Dauphine to Issy, Alouette to Villacoublay and from Biggin, Dauphine from Heliport.	
C. Haardt	1 3 5	M.S. Paris	Dauphine to Heliport, Alouette to Biggin and from Villacoublay, Dauphine from Issy.	Renault/Saulnier team.
K. E. Johnstone	1 3 59	M. S. Paris	M/c to Heliport, Widgeon to Biggin, Alouette from Villacoublay, car from Issy.	
Lt. P. R. G. Williams ..	1 4 8	Vampire T.11 ..	M/c to Heliport, Widgeon to Biggin. M/c from Villacoublay.	1st Batt., Welsh Guards entry.
J. L. Rouget	1 4 15	Meteor 11	M/c to Northolt and from Le Bourget	
J. K. Griffiths	1 16 8½	Miles Student ..	Car to Heliport, Widgeon to Biggin. Widgeon from Villacoublay, car from Issy.	Sponsored by W. Yates, M.P.

Competitor	Best time	Channel crossing aircraft	Additional transport means and route (P=from Paris)	Remarks
	h. m. s.			
†F. C. Ferguson	1 17 29	Miles Student ..	M/c to Chelsea, boat to helicopter, Bell 47J to Biggin. Car from Villacoublay.	Prize for determined, fast single-handed attempt.
Capt. P. F. Tappenden ..	1 24 10	H. P. Hastings ..	P. Land Rover to Issy, Widgeon to Persan, Whirlwind from Hornchurch, m/c from Heliport.	44th Independent Parachute Brigade team of four. Paradrop at Hornchurch.
H. A. J. Silley	1 31 20	Cessna 310	P. Car to Issy, Widgeon to Villacoublay and from Biggin, car from Heliport.	Day-return business trip.
†Bill Aston	1 33 32	Piaggio P.136 ..	Car to Heliport, Bell 47J to Barking Creek, car from Villacoublay.	Prize for initiative and demonstration of amphibian.
J. L. Halliday	1 37 56	Piaggio P.136 ..	M/c to Heliport, Widgeon to Woolwich and from Villacoublay, m/c from Issy.	
N. Ripley	1 38 22	B.E.A. Viscount ..	M/c to L.A.P. M/c from Le Bourget.	Scheduled air service.
R. Lestourneaud	1 40 41	Air France Viscount ..	Car to L.A.P., car from Orly.	Scheduled air service.
S. Holmes	1 47 13	B.E.A. Viscount ..	Car to Heliport, Widgeon to L.A.P., car from Le Bourget.	Scheduled air service.
D. N. Bamford	1 50 35	Air France Viscount	Car to Paddington, train to West Drayton, car to L.A.P. and from Orly.	Scheduled air service.
S. Goodman	1 53 47	Air France Viscount	Car to L.A.P. and from Orly.	Scheduled air service.
B. H. Arkell	1 54 12	Air France Viscount ..	Car to Heliport, Widgeon to L.A.P., car from Orly.	
P. G. Fraullet	1 54 26	Air France Viscount ..	Cycle to L.A.P. and from Orly.	Scheduled air service.
D. Gibour	1 56 24	Miles Student ..	P. Car to Issy, Widgeon to Villacoublay and from Biggin, launch, car, m/c from Heliport.	Sponsored by W. Yates, M.P.
Miss H. M. Goddard ..	1 59 3	Olympic DC-6B ..	Car to L.A.P. and from Orly.	Scheduled air service.
†Mme. M. Rassam	1 59 31	Air France Viscount	P. Taxi to Orly and from L.A.P.	Prize for energetic airline traveller with no special arrangements.
G. R. Shepherd	2 0 52	Air France Viscount ..	Car to L.A.P. and from Orly.	Scheduled air service.
E. McAully	2 12 13	Proctor	M/c to Croydon and from St. Cyr.	
Cpl. G. A. Weckerle ..	2 13 42	Beech D.18	P. Car to Villacoublay and from L.A.P.	American private entry.
Mrs. A. J. Bridge ..	2 16 26	B.E.A. Viscount ..	Underground to W. Acton, car to L.A.P. and from Le Bourget.	Scheduled air service.
B. Taylor	2 18 54	Rapide..	Car to Heliport, Widgeon to Croydon and from Villacoublay, car from Issy.	
†O. Dixson	2 21 30	B.E.A. Viscount ..	Invalid car to L.A.P., wheel-chair and car from Le Bourget.	Polio victim on scheduled air service. Prize for courageous and fast journey by disabled competitor.
M. L. Brewar	2 21 43	Proctor 2	Car (1929 Bentley) to Biggin, car from Toussus.	
John Webb	2 27 17	Bristol 170	Car to Lydd and from Le Bourget.	On proposed Lydd–Paris ferry. Silver City entry.
N. Jones	2 34 42	Jodel D.117	Taxi to Croydon and from Beauvais.	
F. A. Laker	2 35 29	Bristol 170	Car to Southend and from Le Bourget.	On proposed Southend–Paris ferry. Air Charter entry.
A. H. Shaw	2 35 30	Air France Viscount ..	Scooter to L.A.P. and from Orly.	Scheduled air service.
G. C. Wright	2 37 16	Aiglet	Car to Northolt and from Toussus.	
†J. E. Hutchinson ..	2 37 46	Proctor	Folding scooter to Croydon and from Le Bourget.	Prize for ingenious use of personal transport.
Cadet J. F. W. Wisley ..	2 39 2	Rapide..	P. M/c to Toussus and from Hornchurch.	Sandhurst cadet private attempt. Parachute descent at Hornchurch.
O. A. Pomeroy	2 41 15	Avro 19	Taxi to Croydon, car from Villacoublay.	
D. E. Millar	2 41 58	Prentice	Car to Biggin and from Toussus.	
Stirling Moss	2 42 7	Bristol 170	P. Car to Le Bourget and from Lydd.	On proposed Lydd–Paris car ferry. Silver City entry.
J. Templeton	2 43 25	Gemini	P. M/c to Villacoublay and from Northolt.	
H. W. Preiskel	2 44 25	Miles Hawk	Scooter and car to Croydon, scooter from Toussus.	
Raymond Mays	2 45 13	Bristol 170	Car to Lydd and from Le Bourget.	On proposed Lydd–Paris car ferry. Silver City entry.
G. A. Eyles	2 45 14	Prentice	Taxi to Heliport, Widgeon to Biggin and from Villacoublay, taxi from Issy.	
J. C. C. Taylor	2 46 37	Proctor	Car to Heliport, Widgeon to Biggin, car from Toussus.	
K. V. O'Rourke	2 54 39	Hornet Moth ..	Car to Croydon and from Toussus.	
E. C. Bemrose	2 55 21	Aiglet	Car to Victoria, B.R. train to Gatwick, car from Toussus.	
G. Houel	2 55 28	Emeraude	M/c to Croydon and from Villacoublay.	
J. M. Conan	2 56 57	Emeraude	Car to Croydon and from Toussus.	
E. St. E. Muller	2 57 20	Consul	P. Moped to Toussus and from Croydon.	Moped carried in Consul.
Miss S. Mekie	3 8 28	Bristol 170	Car to Victoria, train to Margate, car to Manston, car from Le Bourget.	Diesel car-ferry train. Silver City entry.
Miss J. H. Short	3 10 35	Turbulent	Scooter to Croydon and from Moiselles.	Flight via Beauvais.
Mlle. C. Blériot	3 19 23	Norécrin 1203 ..	P. Car to Villacoublay. Train from Gatwick, car from Victoria.	Cousin of Louis Blériot.
L. W. Wightman	3 28 1	DC3	Taxi to Lympne and from Beauvais	On Skyways regular coach-air service.
P. J. Houston	3 51 26	Turbulent	Car to Croydon and from Moiselles.	Low-cost attempt. Flight via Beauvais.
R. Birkett	3 53 6	DC3	Coach to Lympne and from Beauvais.	Skyways entry; accelerated coach-air service.
Mrs. E. Sheridan	3 58 38	Bristol 170	Cycle to Southend and from Le Bourget.	Scheduled Air Charter service. With Clive Sheridan (3 hr. 58 m. 45 s.).
L. R. Pond	4 10 37	Turbulent	Cycle to Croydon and from Moiselles.	Low-cost attempt. Flight via Beauvais.
Capt. V. Hewitt	4 13 21	Air France Viscount ..	Car to L.A.P. and from Orly.	Oldest competitor. Sheduled air service.
H. A. Pitt-Roche	4 16 1	—	P. Car to Moiselles, Helicopter from Biggin, car from Heliport.	
J. H. Sanders	4 16 38	Tiger Moth	Car to Elstree and from Toussus.	
F. T. Gonggrijp	4 27 14	Dove	Car to Gatwick and from Le Bourget.	Editorial team from Dutch newspaper.
H. J. van Overvest ..	4 28 29	Bucker 181	Car to Southend, car and motor-boat from Pontoise.	Flight via Beauvais.
†D. M. Mott	4 28 32	Turbulent	P. Home-built car to Beauvais and from Southend.	Hatfield Tech. College entry. Prize for students' initiative and ingenuity in building own cars and aeroplanes.
Miss M. Privett	4 29 16	Chipmunk	Cycle to Biggin and from Toussus.	Low-cost attempt.
Major G. P. Reid ..	4 30 40	Autocrat	Scooter to Biggin and from Toussus.	Scooter carried in Autocrat.
Capt. D. W. Skillman ..	4 33 11	Rapide..	Car to Fairoaks, train and taxi from Toussus, via Versailles.	4 hr. 50 min. 18 sec. with eight passengers at £2 5s. 4d. each on first attempt.
Lord Montagu	4 52 6	Bristol 170	P. 1909 Humber to Le Bourget and from Lydd.	Silver City service.
Miss J. L. Ferguson ..	5 15 31	Turbulent	Cycle to Croydon and from Moiselles.	Solo low-cost attempt. Flight via Beauvais.
D. A. Whybrow	5 44 27	Bristol 170	Car to Southend and from Calais.	On scheduled car ferry service. Air Charter entry.
M. Goodwin	5 55 32	Tiger Moth	Vintage car to Biggin, car from Toussus.	
C. C. R. Vick	6 19 55	Klemm L.25a ..	Scooter from Biggin and from Toussus.	
R. J. Sewell	6 29 32	Proctor	Foot, cycle, boat, car to White Waltham; car, train, Metro, horse-carriage from Toussus.	
P. Bates	6 50 5	Bristol 170	P. Special van to Le Touquet and from Lydd.	Polio victim in "iron lung" on schedule Silver City service.
H. G. Clark	6 52 19	Bristol 170	Van to Southend and from Calais.	On scheduled Air Charter service.
G. J. Grensted	7 24 36	Bristol 170	P. Bubble car to Le Bourget and from Southend.	Best of eight attempts. Air Charter service.
J. G. Holton	10 15 44	Bristol 170	1924 Humber to Lydd and from Le Touquet.	On scheduled Silver City ferry service.
H. Tansley	10 22 33	Tiger Moth	P. Motor-mower to Toussus and from Croydon.	Hatfield Tech. College entry.
A. D. Piggot	11 25 0	Eon Primary/Messenger	Car and trailer to Blackbushe and from St. Cyr.	Glider in trailer.
I. F. Brown	11 44 35½	Dove	Cycle to Lydd and from Le Touquet.	
J. Salis	12 17 22	Blériot replica ..	P. 1909 Humber and truck to Calais, Humber from Lydd.	Reconstruction of Blériot's cross-channel flight.

* BEAline Syndicate, winners of special £1,000 prize for journey time, originality, ingenuity and initiative: P. W. Brooks; R. H. Chadwick; B. J. L. Haimes; J. W. G. James; R. F. Laver; L. M. Leaver; P. C. Pinfield; I. Scott-Hill; W. Simpson; D. M. Wiggins; Miss W. M. Willis; E. P. Whitfield; Mrs. B. A. Wheeler. Pilots: Capt. J. A. Cameron (Bell 47J for solo return speed attempt); P. Buggé and Capt. G. Greenhalgh (Comet 4B).

† Winners of special £100 consolation prizes.

Flying the Morane-Saul

SINCE the official opening of the College of Aeronautics at Cranfield in 1946, its Department of Flight has operated specially instrumented Ansons and a Dove to provide practical illustrations of the theories taught in that and other departments of the establishment. Carrying groups of four or six students and their lecturers, these aircraft have facilitated the teaching of various flight testing techniques and the reduction of results, during the two-year post-graduate course.

The piston-engined aircraft used for observation in the air by the students have done an invaluable job, and a new Dove is being modified to continue this aspect of flight testing. There has, however, been a pressing requirement for a turbojet machine for the more advanced phases of research theory.

The selected type had to carry three or more passengers, plus extensive test instrumentation and equipment; have two engines for passenger safety; operate within a relatively wide range of speeds and accelerations; and compare reasonably closely with the capital and operating costs of the piston-engined aircraft. On examining the available light jets, the Morane-Saulnier M.S. 760 Paris was found most suitable, and the College became one of the first civil operators of this type when it took delivery of the ninth aircraft F-WJAC (now G-APRU) last December.

Since then, the Paris has been refurbished to incorporate special instrumentation, and students have been measuring its overall performance characteristics. Additional equipment to assess stability, control and manœuvrability is being installed during the summer vacation.

The test equipment so far fitted includes continuous trace recorders and a display of six micro-ammeters on a compact panel between the front and rear pairs of seats. Each instrument may be selected to show any of 15 quantities such as elevator, tailplane, rudder and flap angles via potentiometers near these control surfaces. Another potentiometer pick-off from an extra Ferranti FH.8 artificial horizon relays angles of pitch and roll, while a similar tie-up with the Sperry CL.1A gyromagnetic compass gives remote indication of heading.

The test equipment imposes little penalty on payload or space for the four occupants who are provided with individual bucket seats accommodating the parachutes required at Cranfield. A reminder of the derivation of the Paris from the original two-seat Fleuret jet-trainer is provided by the aerobatic harnesses incorporating an additional short strap from the centre of the seat pan to the quick-release box, as an effective restraint under negative g. The Paris is aerobatic as a two-seater, without tip-tanks.

Although the aircraft squats low on its short nosewheel undercarriage, a set of steps is necessary for access to the cockpit. The large canopy slides back clear of the rear seats, and, like all the services in the Paris—undercarriage, trimmers, flaps and air brakes—is electric. With the single-piece moulded windscreen, set rather far forward of the pilots, it affords a magnificent all-round view, while its "hump" fairing behind the cockpit provides stowage space for the internal fuel tanks, as well as the optimum aerodynamic shape behind the canopy.

Apart from the rearranged panel of British instruments to port, and additional primary panel plus the Ferranti horizon on the right, the cockpit layout of the Paris has not been greatly changed. As the M.S.760 is intended for instrument training as well as high-speed communications, dual flight controls are fitted, but undercarriage, flap and air brake switches are provided only on the left-hand side of the cockpit.

The port stick has a thumb-button for tailplane and aileron trims, the settings of which are shown on a combined gauge incorporating the flap position indicator. Toe brakes are provided for both occupants on the plate-type rudder pedals, which are adjustable for leg length and may be connected as required by a central clutch lever for nosewheel steering or castoring. The starboard rudder pedals may also be rapidly disengaged from the directional control system if not needed.

Duplicate throttles are provided on a central quadrant, which also houses the fuel control levers, with their ignition buttons, for the twin 880 lb. s.t. Turboméca Marboré IIC turbojets. Above the quadrant is the engine instrument panel, with fuel gauge for the 202-gal. fuselage tanks, warning lights for the 51½-gal. tip-tanks, and flowmeter, tachometer, jet-pipe temperature and oil pressure gauges. Starting and booster pump switches are below these instruments, and, like other systems in the Paris, are liberally provided with press-to-test warning lights.

My trip in the Paris at Cranfield was during a routine research flight into accelerated levels at 20,000 ft., with an instructor and student in the rear, and Flt. Lt. A. J. McDonald in the left-hand seat. With full internal fuel, we were therefore operating at about 7,000 lb. gross weight, the maximum permissible being 7,725 lb.

After Flt. Lt. McDonald had started the Marborés by the non-automatic but simple electrical system, I took over to taxi round the perimeter track, with the assistance of the steerable nosewheel. About 14,000 r.p.m. was necessary to start rolling, after which a small amount of throttle giving 11-12,000 r.p.m. was adequate for a brisk ground speed. Steering loads from the rudder pedals are light, and the ground manœuvrability is good, while the hydraulic brakes are effective when required for tighter turns.

Engine handling is fairly normal, a little care being necessary on the ground to obviate compressor stall, but acceleration is automatically governed in the flight range. The optimum time to increase power from 17,000 to 22,600 r.p.m. varies from five seconds at 5,000 ft. or 10 or more at 23,000 ft. and above.

Before take-off, inflating the canopy seal for cabin-pressurization results in a welcome reduction in compressor noise. Other vital actions include checking lateral and tailplane trims at zero and slight nose-up, respectively, disengaging nosewheel steering and lowering a little flap. Recommended take-off flap is 17 degrees and 10 degrees was experimentally selected at the start of our sortie.

At 22,600 r.p.m., the Paris could be held on the brakes, which during the rapid acceleration after release can initially be used to keep straight. They are only really necessary in a cross-wind, for which the Paris is cleared up to 20 knots, until the rudder becomes effective at about 60 knots.

At 70 knots, slight aft stick raises the nosewheel, but I found that care was needed to avoid an excessive angle on unsticking at 85-90 knots. With its fuselage-mounted turbojets, the Paris has minimum control and safety speeds for single-engined flight of 110 knots, and the rudder, with its thick U-shaped trailing-edge, is sufficiently powerful to keep straight down to stalling speed under asymmetric conditions.

ıier Paris

by John Fricker

Six of the entries which achieved less than 60 minutes in the "Daily Mail" race used the M.S. Paris. This aircraft is owned by Cranfield

Photographs copyright "The Aeroplane and Astronautics"

After undercarriage retraction, within 15 seconds and accompanied by little change of trim, we accelerated rapidly to the optimum climbing speed, in our configuration, of about 190 knots I.A.S., at which the initial climb is well over 2,000 ft./min. Flap retraction at 140 knots was not accompanied by a noticeable sink or trim-change.

The Paris appeared to be an excellent mount for instrument flying, combining good stability characteristics with light and well-harmonized controls. The plain ailerons are crisp and provide a high rate of roll. The tractability of the Paris was proven by some close formation flying alongside the photographic Dove at about 8,000 ft., where the necessarily abrupt power changes to maintain position were accepted without tendency to surge by the Marborés.

They were then spinning at about 17,000 r.p.m., to maintain the formation speed of 150 knots or so, but for normal cruising, 21,000 r.p.m. (710 lb. thrust per engine) gives a true airspeed at the optimum altitude of 19,800 ft. of about 350 m.p.h. (M=0.65). Cabin pressure is then equivalent to about 9,500 ft., while at the peak cruising height for range of 23,000 ft. the equivalent becomes 11,500 ft. In the United States, where the Paris is being marketed by Beechcraft for executive use, it is limited to a peak altitude of 25,000 ft. by the C.A.A., although its service ceiling is well above 30,000 ft. The same limitation is applied by A.R.B.

The Paris will reach 20,000 ft. in less than 15 minutes, and at that height I found we were still indicating nearly 1,500 ft./min. ascent on the V.S.I. It is necessary to watch the J.P.T. and r.p.m. gauges fairly closely during the climb, and throttle back slightly from time to time, to keep temperatures and engine speeds within limits.

At 25,000 ft., we throttled back for the accelerated level runs. These are achieved by reducing speed to 110 knots, and then opening up to full power, maintaining height to within 50 ft. in the subsequent acceleration to about 240 knots (M=0.54). A great deal of information can be extrapolated from the recording of instrument readings accompanying this procedure.

Not a great deal of longitudinal trim change was involved, although a trim button on the starboard stick would have helped, while keeping within the fairly narrow height band was also made slightly difficult by the primary instruments, and particularly the absence of a V.S.I. on my side.

No very high-speed manœuvres were tried in the Paris, which at altitude has a limiting Mach number of M=0.7, and apparently no undesirable compressibility characteristics. At lower altitudes, Vne is 350 knots, and the maximum load factors, with full tip-tanks, +4.4 and −1.76 g.

At the end of the speed scale, the Paris behaves very well, as we found in a prolonged series of stalls over Cranfield at about 12,000 ft. We had descended quite rapidly with the aid of the spoiler-type air brakes, which are fairly effective, with little trim change and moderate buffet, although they are slightly slow in operation.

Clean, and with only a little power, mild pre-stall buffet began at about 90 knots I.A.S. and continued to the point of breakaway some 5 knots later, which was achieved after hard backward pressure on the stick. When this was maintained, the Paris tended to pitch gently in the semi-stalled condition, keeping quite straight and retaining its lateral control. In the "all-down" configuration, the breakaway came at about 80 knots I.A.S., after less buffet, and was accompanied by a mild roll to port.

The stalls seemed completely innocuous, as one would expect from the lightly tapered wings, with no tendency towards a spin. The Paris has been extensively spun during its flight-testing,

with a height loss of some 1,600 ft. per turn, and almost instantaneous recovery.

This low-speed docility is apparent in the circuit, where the undercarriage can be lowered (in my case after a little co-operation from the left-hand seat) below 160 knots. During the 15-second extension of the landing gear, the first stages of flap may be lowered if required, although for the full 55 degrees, the speed must be below 140 knots. The air brakes may be used throughout the approach and landing if required.

In the approach configuration, the Paris retains its good qualities of stability and control, and can be trimmed, via its adjustable tailplane, to a speed of 90-100 knots on finals. Elevator response is precise for the round-out, and the nose-wheel can be kept off the ground after touch-down on the 7.2 ft./sec. mainwheel legs for aerodynamic braking. After the landing run of perhaps 800 yd., nosewheel steering can be engaged for taxi-ing.

Leading Particulars

DIMENSIONS.—Span (inc. tip-tanks), 33 ft. 3 in.; length, 33 ft.; height, 8 ft. 6 in.; wing area (gross), 193.68 sq ft.

WEIGHTS.—Empty, 4,280 lb.; loaded, tip-tanks empty, 6,903 lb.; max. gross, 7,725 lb.

PERFORMANCE.—Max. speed, 405 m.p.h. at sea level; cruising speed, 350 m.p.h. at 16,400 ft.; initial climb, 2,264 ft./min.; single-engine climb at 3,300 ft., 420 ft./min.; single-engine ceiling, 8,500 ft.; service ceiling, 32,800 ft.; still-air range, at 22,960 ft., 930 miles; take-off run, 820 yd.

New Racers Unlucky at Coventry

WELCOME contenders, if not actual newcomers, to the annual air racing events at Coventry this year were six Turbulent single-seaters from the Norman Jones' stables at Croydon. The fact that no wins were scored cannot be accounted against the design, but must be attributed to that excess caution with which even the most experienced handicapper approaches a new aeroplane.

Once again the classic event was won by a veteran with other veterans hard on his tail. As Mr. Charles Newton, chairman of the Northamptonshire Aero Club, said at the dinner given by the club at Syswell in honour of Mr. A. J. Spiller, the winner, "it is a scandal that no British manufacturer has sponsored a new design in this vital market."

THE KING'S CUP AIR RACE 1959—Four laps of 17-mile Course

Pilot and Aircraft	Starting Order	Starting Time	Net Flying Time	Speed	Place
		m. s.	m. s.	m.p.h.	
A. J. Spiller, Proctor, G-AHFK	13	17 6	46 12.4	143	1
R. R. Paine, Hawk Speed, G-ADGP	21	24 9	46 12.6	189	2
H. G. Davies, Gemini, G-AKKB	19	21 17	46 15	167	3
J. S. Wood, Auster VJ, G-AIKE	9	10 6	46 19.2	115	4
N. Baldwick, Auster Mk. 6, VX-113	13	13 24	46 24.2	126	5
L. J. Benjamin, Tiger Moth, G-APRA	6	7 22	46 30.8	106.5	6
P. Blamire, Gemini, G-ALZG	20	22 15	46 30.8	171.5	6
Miss M. McKellar, Turbulent, G-APBZ	3	1 3	46 32.6	91.5	8
B. J. Snook, Tiger Moth, G-ANZZ	11	11 33	46 35	119	9
A. Barker, Auster J.5.B., G-AMMZ	12	12 1	46 48.4	120	10
D. Hartas, Hornet Moth, G-ADNB	10	11 26	46 48.6	117.5	11
G. F. Hancock, Tiger Moth, G-APAW	8	8 17	47 4	107.5	12
Sqn. Ld. J. de Milt Severne, Turbulent, G-APNZ	1	0 0	47 6.6	88.5	13
J. Heaton, Jackaroo, G-APAO	4	6 9	47 16.6	101	14
W. V. Fitzmaurice, Jackaroo, G-ANZT	5	6 18	47 20.6	101.5	15
J. E. G. Appleyard, Chilton, G-AFSV	17	18 57	48 24	141.5	16
D. W. Phillips, Turbulent, G-APLZ	2	56	48 46.8	87	17
J. M. Donald, Tiger Moth, G-ANZU	7	7 58	53 46.8	91	18
J. H. Denyer, Auster, G-AJEH	14	14 9	Retd.	Retd.	Retd.
S. F. Jours, Proctor, G-ALCK	16	18 29	Retd.	Retd.	Retd.
T. G. Knox, Proctor 3, G-AIHD	18	19 12	Retd.	Retd.	Retd.

The weather was bad enough on the last day of the events at Coventry (July 11) to cause postponement of the National Parachute Competition, and to mar the British Lockheed Aerobatic Competition in which, so great is International interest, those in the first five places were all visitors from across the Channel. Surely there should be an early possibility of establishing the title of "World Aerobatic Champion" for the winner.

International Aerobatic Championships

The winner was F. Liardon, of Switzerland, who flew a Bucker Jungmeister. Second was J. D'Orgeix, a member of the French team, in a Stampe biplane; third, G. Verette, also from France and in a Stampe; fourth, L. Biancotto, France, Tiger Moth; fifth, G. H. Pawolka, Germany, Dornier Bu.131; and, tying for sixth place, M. Charollais, of France, Stampe, and C. Labouchere, Great Britain, Tiger Moth. The team prize went to France and the John Percival Challenge Cup for the highest-placed British competitor went to C. Labouchere.

Generally speaking, it was reckoned this year that the overall standard was much higher than in previous years. There were no new manœuvres as such, but the combinations were, perhaps, more thoughtfully chosen to give a coherent pattern rather than a disconnected series of different movements.

This was particularly noticeable in the case of the winner Liardon, who flew his Jungmeister through a beautiful series of manœuvres with no significant pauses between them. He also showed a nice balance of contrast by following a slower movement with a rapid one—for example, a series of five slow rolls to starboard was followed by a sudden flick roll to port.

The final demonstration was by G. H. Pawolka, the sole German entrant, who produced the only tail slide of the afternoon. This followed a half bunt and roll out at the bottom followed by another half bunt and inverted climb. Pawolka also achieved some beautifully co-ordinated stall turns.

The King's Cup

The contestants for the King's Cup Race and the three qualifying rounds were nearly all familiar faces and mostly exceedingly well-known aircraft. The standard procedure was again adopted with the races for the Kemsley Challenge Trophy, the Osram Cup and the Tiger Moth Trophy forming the eliminating rounds for the King's Cup Race itself.

With three little Turbulents leading the way, all the aircraft got off to a good start at various intervals. For the spectators, however, their subsequent progress was not easy to follow. The short course of 17-18 miles meant that the slowest aircraft had completed one lap before the back-markers took off.

Indeed the race hardly became interesting until the inevitable longish pre-finish pause with no aircraft in sight when one knew that soon the whole field was likely to arrive in a bunch and the next aircraft past would be the winner. It says much for the handicappers that Ron Paine in his Hawk Speed Six, the scratch man, was only a yard or so behind the first home—A. J. Spiller in a Proctor 3—and not all that far in front of the little Turbulents and the slower craft. In point of fact, the first six or so over the line were very close together and at the control tower it was difficult to detect their actual order.

A. J. Spiller won the Cup with his Proctor averaging 143 m.p.h. Ron Paine, second in the Speed Six averaged 189 m.p.h.

Above, Aerobatic Champion F. Liardon (Switzerland) and S. F. Jours, Kemsley Trophy winner.

Left, Capt. N. Baldwick, Osram Cup; A. J. Spiller, King's Cup; and R. R. Paine, S.B.A.C. Trophy.

Below, B. Snook, Grosvenor Trophy; D. Hartas, Tiger Moth Trophy; and J. H. Denyer, Norton Griffiths Trophy.

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and won the S.B.A.C. Challenge Trophy; and H. G. Davies, flying Fred Dunkerley's Gemini, was third having averaged 167 m.p.h.

As the competitor with the highest aggregate of points during the races, Capt. N. Baldwick of the Army, flying an Auster Mk. 6, became the 1959 Air Racing Champion. He was 5th in the King's Cup.

The Kemsley Trophy was won by S. F. Jours flying a Proctor 3c; the Osram Cup went to Capt. N. Baldwick in the Auster 6; and the Tiger Moth Trophy to D. Hartas flying a Hornet Moth. Fastest time in the Osram Cup race was by J. H. Denyer (127 m.p.h.) who thereby gained the Norton Griffiths Trophy; and Beverly Snook received the Grosvenor Cup for the fastest speed (118.5 m.p.h.) in the Tiger Moth Trophy race.

The Display

Because of the weather, the display programme had to be somewhat drastically cut. It was, however, opened as scheduled by the United States Air Force with an air refuelling pass by a KB-50 tanker. The programmed B-66 and two F-100s being refuelled simultaneously, however, turned into one Voodoo several feet from contact. The combined exhaust smoke from the multitude of engines involved was quite impressive.

Two R.A.F. Jet Provosts from Little Rissington put on a magnificent show of co-ordinated manœuvres and passes. Transport Command showed how it operates at each end of the speed scale—with a Beverley making a lot of noise, a very steep take-off and a remarkably short landing; and a Comet 2 making a different sort of noise and flying fast then slow.

From R.A.F. Cranwell came Flt. Lt. D. F. Moffatt, winner of this year's Wright Jubilee Trophy, in a Vampire. He gave a masterly display of aerobatics and used up a good deal more sky than the microscopically powered Lockheed Trophy contestants.

Two gliders flying in company showed how much could be done without any power at all. And as a highlight the nine Hunters of No. 111 Squadron did all that one has come to expect of them—and then some.

Sea Vixen in Service

Photograph copyright "The Aeroplane and Astronautics"

Left, Commander M. H. J. Petrie, C.O. of No. 892 Squadron, receiving a model of the Sea Vixen all-weather fighter from Sir Aubrey Burke, chairman of de Havillands, at Yeovilton on July 2.

WITH the commissioning of No. 892 Squadron under the command of Cdr. M. H. J. Petrie at R.N.A.S. Yeovilton (H.M.S. "Heron") on July 2, the first operational de Havilland Sea Vixen FAW.1 unit came into being with the Fleet Air Arm. Formed around the aircraft and crews of No. 700 "Y" Flight, which was also commanded by Cdr. Petrie, the Squadron is working-up at the Navy's all-weather fighter station before embarking in H.M.S. "Ark Royal" in February of next year.

All the present operational Sea Venom squadrons are to be replaced by Sea Vixen-equipped squadrons of which at least six are to be formed as soon as production aircraft are available to the Service. Each squadron is to have an initial complement of eight Sea Vixens which is to be built up to 12 aircraft.

Fully cleared for service, including its weapons system and various armaments, the Fleet Air Arm's new all-weather fighter has been undergoing Service flying trials with No. 700 "Y" Flight since November, 1958. These have covered intensive flying trials, weapons system evaluations and a three week work-up period on H.M.S. "Victorious." During this period at sea, three aircraft each completed between 50 and 60 arrested landings, a total of 172 altogether, of which 23 were at night.

The first production contract for Sea Vixens was announced in February, 1955. Another substantial order was placed in June of this year following the completion of the Service trials.

In April, 1956, the first arrested landing-on by a "Navalized" D.H.110 took place on the carrier "Ark Royal" and in March of the following year the prototype Vixen was flown. During 1957-58 trials were undertaken by R.A.E. Boscombe Down and Bedford prior to the formation of No. 700 "Y" Flight in November, 1958. Sea trials by a production type started in July, 1957, with 50 landings on "Ark Royal," which were followed by 166 deck landings on "Centaur" by two aircraft in January, 1959, and the more recent work-up on "Victorious."

In addition to deployment as the future all-weather fighter of the Fleet, the Sea Vixen has a second rôle of strike/reconnaissance. For its first task it can carry up to four D.H. Firestreak infra-red homing AAMs, or four Microcell underwing rocket packs each housing 24 folding-fin 2-in. unguided AAMs, plus 28 2-in. unguided AAMs in two retractable fuselage packs. In the strike rôle, which includes low-level, it can be armed with the 28 2-in. internally stored AAMs, a maximum of 24 3-in. rocket projectiles mounted on four underwing pylons and/or two 1,000-lb. bombs on the two outer pylons. These two outer pylons can also be used to carry two 150 Imp. gal. fuel tanks.

It has been stated that the weapons system of the Sea Vixen is not tied to the Firestreak or any development of the missile. This could mean that the Navy are considering the use of semi-active homing AAMs to overcome the problem of cloud effect on Firestreak.

One interesting development in this field was shown at the recent Paris Show where a model of an F-102 Delta Digger was displayed carrying simultaneously three GAR-ID Falcon semi-active homing AAMs and three GAR-2A Falcon AAMs with infra-red homing.

For training crews in the use of Firestreak when the Squadron has gone aboard H.M.S. "Ark Royal" a number of live firings will be undertaken in addition to the normal dummy interceptions. Sea Vixens will also be fitted with "acquisition rounds" to give crews simulation of the interception phase of an attack without the need to fire.

Powered by two Rolls-Royce 200-series Avons rated at 10,000 lb. s.t. each, the Sea Vixen has an estimated all-up weight of approximately 35,000 lb.

ASTRONAUTICS and MISSILES

"Paddle-wheel" in Space

MUCH leeway was made up on the satellite front by the launching on August 7 of Explorer VI, the so-called "paddle-wheel" satellite. Not only had the Americans advertised well in advance the date it would be fired but the results coincided remarkably well with the predicted orbit.

The vehicle is apparently pursuing a flat elliptical path with a perigee (low point) of about 157 miles and an apogee of some 26,380 miles; it takes approximately 12¼ hr. to complete one orbit.

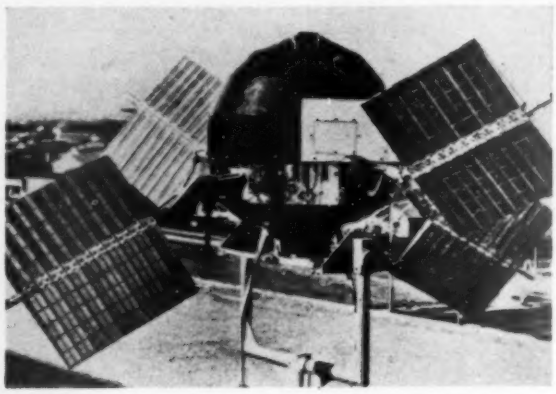
Weighing 142 lb., Explorer VI has a 26-in. dia. centre-body with four projecting 20-in. square vanes. These vanes, mounted on aluminium arms, are designed to fold downwards while inside the nose of the launching rocket; they spring out and lock into position when a plastic cover is released during firing of the third stage.

Each vane contains 2,000 silicon-based solar cells mounted in a structure of honeycomb plastic and covered by a glass filter. The cells convert sunlight into a weak electrical current, being wired in series to produce maximum voltage for re-charging the satellite's chemical batteries.

Major purpose of the experiment is to probe the radiation belts girdling the Earth and also the magnetic field which influences their distribution. A 2½ lb. scanning device is carried for the purpose of relaying an elementary picture of the Earth's cloud cover. Micrometeor detectors are fitted to determine the size and frequency of particles striking the satellite. Four experiments are being made to study the behaviour of radio waves from the satellite and its ground stations, to discover more about the problems of deep space communication.

Explorer VI's transmitters can be turned on and off by radio command from the ground. This is being done both to conserve battery power and as a means of stilling the satellite's "voice" at times when it might prove embarrassing to other space experiments. Inside the centre-body, an electronic package called "Telebit" collects and stores information picked up by the instruments and transmits the data at high speed when interrogated by a ground station.

In the base of the satellite is a 5 lb. 14 in. "kicker" rocket fitted in case the vehicle swung too close to Earth on its first transit, being designed to heighten the perigee by as much as 50 to 100 miles. It was not required but may still be operated



to modify the orbit at a later date. Meanwhile, the frequency of its radio-signal "trigger" is being kept secret.

Explorer VI is expected to remain in orbit more than a year until atmospheric drag at perigee, causing the orbit gradually to contract, makes the vehicle re-enter the atmosphere.

Once more Jodrell Bank has played a leading rôle in tracking operations and first picked up signals from the satellite 27 minutes after it was launched from Cape Canaveral. When the vehicle was 1,000 miles out in space, an American working at Jodrell Bank switched off and on one of the transmitters by radio command. If necessary, a switch can also be tripped from the ground to change the charging rate of the vehicle's batteries.

The "paddle-wheel" satellite was originally designed as a test-vehicle for two Venus probes intended to have been launched last June when Venus was nearest to Earth. These experiments were called off because of technical difficulties, and the next favourable conjunction will not occur until about January 13, 1961.

The programme has therefore been modified to include the present experiment, an attempt to put the next vehicle into an even flatter orbit out as far as the Moon, and finally an attempt to launch the third vehicle around the Sun on a path which intercepts the orbit of Venus, but not the actual planet.

Soviet Space Research

RUSSIAN animals are being sent farther and farther into space. *Tass* reported on July 6 that two dogs, called Otvazhnaya and Snezhinka (Courageous and Snowy) and an unnamed rabbit, had travelled in the nose-cone of a single-stage ballistic rocket "to a great altitude."

Experiments of this kind with animals were begun in Russia several years ago under the direction of A. V. Pokrovski, during which rockets are reported to have reached heights of between 132 and 280 miles. As is Soviet custom as much equipment as possible was packed into the test vehicle. In addition to recording physiological reactions of the animals, a wide range of geophysical information was secured. One of the principal claims was that the composition of light gases in the atmosphere had been obtained for the first time.

According to *Tass*: "At 6.40 a.m. (Moscow time), on July 2, 1959, another single-stage geophysical ballistic intermediate range rocket was launched in conformity with the programme for scientific exploration of the upper layers of the atmosphere. The rocket was fitted out with equipment for studying the ultra-violet part of the solar spectrum, the structure of the ionosphere, the shower of micrometeors, and the direction and speeds of air currents at various altitudes, as well as equipment for determining the density, pressure, temperature and composition of the atmosphere at various altitudes.

"Experimental animals . . . were placed in the rocket in order to study the vital functions of animals when ascending to a great altitude. It was the third time that the dog Otvazhnaya had been taken up in a rocket. The total weight of the scientific equipment and the animals lifted in the rocket exceeded 2,000 kg. (about two tons).

"All went well with the launching. The safety arrangements ensured the landing of the cone and container with the scientific equipment and experimental animals which were separated from the rocket. According to preliminary data, the research objectives were accomplished and valuable information on all questions was obtained. The animals are quite well. The repeated ascents of the same animals have made it possible to obtain data on the adaptability of animals to rocket flights."

Detachable nose-cones of the type used in these experiments were shown in the Science section of the Russian National Achievements Exhibition in Moscow in February; they

(*Continued on page 37*)

Hi! faster with that feed!

As jet airliners get bigger, the more fuel they carry and the faster it needs to be fed in. At 200 of the world's airfields, Shell hydrant systems provide fast, safe fuelling for long-range airliners. The first hydrant systems were installed by Shell over 25 years ago, and in 1947, anticipating the demands of a new generation of long distance airliners for greater fuel uplifts, Shell commissioned the first large-scale hydrant fuelling installation. Since then, Shell Research has been constantly at work developing and perfecting hydrants. By the end of 1959 over 1,000 jet and prop-jet airliners are expected to be in service and the largest of them can carry up to 20,000 gallons of fuel. Modern Shell hydrant systems meet the needs of jet airliners of all types and are designed to fuel several of these aircraft simultaneously, delivering fuel to each aircraft as fast as it is wanted at speeds up to 1,000 gallons per minute per aircraft. In this way peak traffic demands will be met while keeping time on the ground to a minimum.

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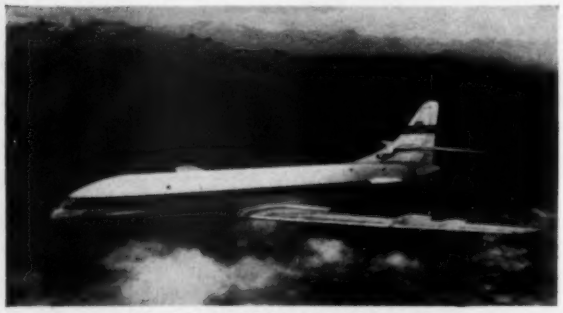

SUD-AVIATION CARAVELLE

On 3rd July, 1959 the British Air Registration Board approved an extension of overhaul life of the Avon RA.29 to 1300 hours. The Avon entered commercial service on the North Atlantic route with British Overseas Airways Corporation on 4th October, 1958 at an overhaul life of 1000 hours.

Approval has also been given for trials at 1600 hours between overhauls.

During overhaul life no scheduled engine unit changes are made apart from the fuel filter element and no internal inspection of the engine is necessary.

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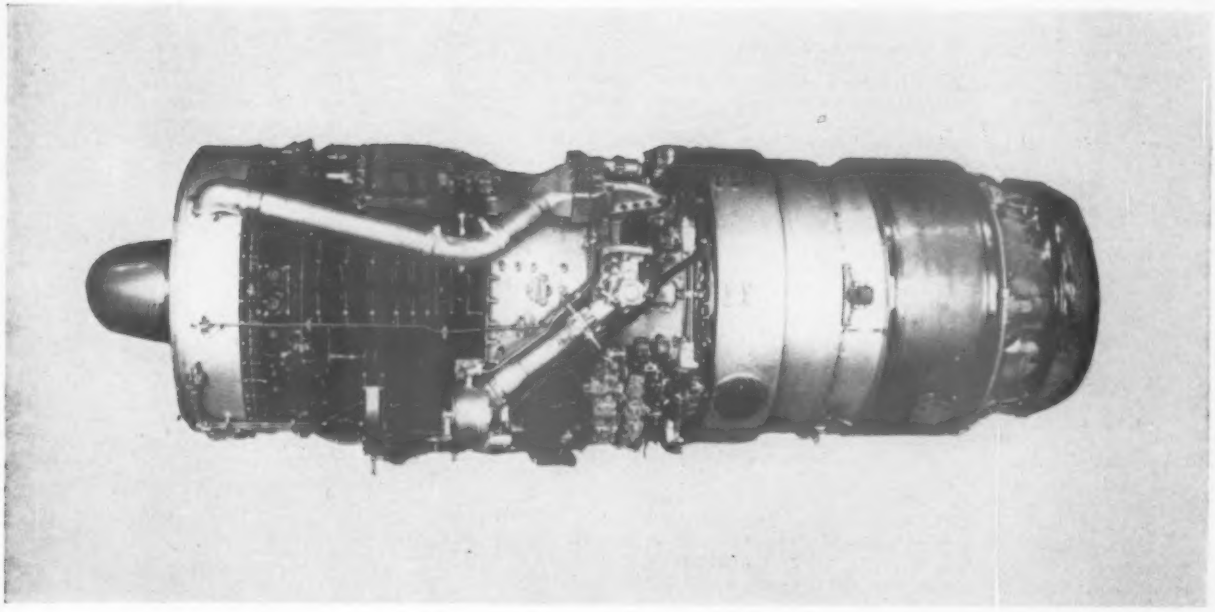

4 MAN-MINUTES PER FLYING HOUR FOR ALL AVON MAINTENANCE

This figure includes the installation of the engine and its removal from the aircraft.

ONE UNSCHEDULED OVERHAUL IN 49,000 ENGINE HOURS

During the first nine months of Comet operation by B.O.A.C. only four engines were removed in 49,000 hours flying for causes considered to be Rolls-Royce responsibility. Only one of these required overhaul, the other three being rectified and returned to service.

AVON ENGINES ARE IN SERVICE WITH OR ON ORDER FOR:—

Aerolineas Argentinas, British European Airways, British Overseas Airways Corporation and East African Airways in de Havilland Comets; and Air Algerie, Air France, Finnair, Royal Air Maroc, Scandinavian Airlines System, Swissair and VARIG in Sud-Aviation Caravelles.

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LUCAS-ROTAX LTD., Toronto, Montreal and Vancouver, Canada.

(*Continued from page 36*)

incorporate a system of petal air-brakes and recovery parachutes (THE AEROPLANE, April 17, 1959, p. 463).

The behaviour of the animals in flight was filmed. A study was made of the biological influence of various upper atmosphere flight factors and weightlessness on the animals' organisms and on their nervous and vital activity and co-ordination of movements.

That the flights had not affected the animals' nervous activity and health, the Russians pointed out, was evidenced by the fact that they show no fear of entering the containers and react quietly to all kinds of experiments. This behaviour has been facilitated by the training the animals receive both before and after the flights. In the laboratory the "space travellers" are inured to noise, vibration and acceleration using respectively a "vibrostand," a noise generator, and a centrifuge.

Alexander Mikhailov, director of Pulkovo Observatory, and chairman of the U.S.S.R. Academy of Sciences' Astronomical Council, has described the launching as a new stage in the study of cosmic space. He drew attention to the record weight of the scientific instrumentation and experimental animals—more than two tons. The safe recovery of the animals and instrumentation, he said, was of great importance to science and demonstrated that it would soon be possible to get back instrument packages from Sputniks. It was also important for the future of manned space travel.

On July 10, Russia launched another rocket containing two dogs and a heavy payload of instruments to an unspecified height and again recovered them in good condition. One of the dogs—Courageous—was the same that had made an ascent eight days earlier.

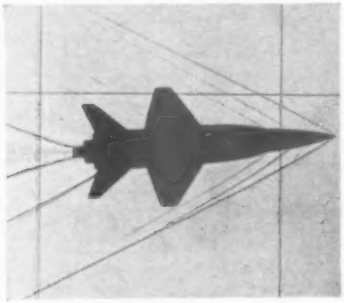
The payload was given as 4,850 lb. and the information obtained was reported by *Tass* to include measurements of the infra-red radiation of the Earth and its atmosphere; photographs of clouds over a vast area; a simultaneous analysis of the ion and neutron composition of the atmosphere; and a measurement of electrostatic fields. The agency added that the two firings this month were reported to have obtained all the research information scheduled in this programme.

With the standard of reliability now reported by the Russians as being achieved in recovering test animals, it should not be long before a man makes a similar ballistic flight, as the key step before putting a Soviet hero into orbit. As yet, however, there is still no positive indication that the Russians have tried recovering a capsule from orbit, such as the Americans are already attempting in their Discoverer programme.

Manned Ballistic Flight

FIRST powered flight of the North American X-15, which the U.S.A.F. hopes to fly ballistically at speeds of over 3,600 m.p.h., and heights of 50 to 100 miles, is expected soon.

Three X-15s have been built. The first was glide-tested for the first time from the B-52 parent aircraft on June 8 over the Mojave Desert, California. Maximum speed reached during flight was about Mach 0.9. Diving sharply after dropping clear of the B-52, the X-15 executed a lazy S turn before lining up with the 10-mile naturally formed runway of Rogers Dry Lake. Coming in fast with nose high, the X-15 touched down on its ski-type rear landing gear and immediately pitched forward on to the conventional nose-wheel. Scott Crossfield, the pilot, said he touched down at about 185 m.p.h.



Aluminium scale model of the X-15, 4¾ in. long, photographed in flight at Mach 2.5 after being launched by a high-speed gun in a Free Flight Tunnel at Ames Research Centre, California.

An initial captive flight of the second machine was made in late July to determine the performance of the B-52 with the research plane mated at its maximum launching weight. The test flight lasted 70 min., and immediately before landing the propellents were jettisoned from the X-15 to check the effectiveness of the tank purging system.

Two Reaction Motors XLR-11 with a total thrust of about 15,000 lb. will be used in early flights; these will be replaced by a single 50,000-lb. thrust engine, the XLR-99, when fully ground tested.

An exclusive analysis of the performance of the X-15 appeared last November 14. Vol. XCV, No. 2463, p. 730 et seq. Pictures of the first X-15 appeared on October 24 last.

Satellite Frustrations

A BAD patch in the U.S. satellite programme occurred in June and July when four consecutive launching attempts ended in failure. On June 3, Discoverer III, launched by a Thor-Hustler, failed to orbit and descended prematurely into the atmosphere. A detachable capsule containing four black mice intended for weightlessness and radiation studies was to have ejected and been recovered after the 17th orbit.

On June 22, a 20-in.-diameter Vanguard "weather satellite" weighing 21¼ lb. plunged into the Atlantic after a failure of the second stage. The satellite was intended to measure the amount of solar heat absorbed by the Earth and re-radiated back into space.

This, the 10th launching attempt with a Vanguard, was the eighth failure. On this occasion, the trouble was ascribed to a comparatively minor component, a regulator valve designed to control helium gas pressure to the second stage propellent tanks. Apparently, the valve did not operate on radio command, with the result that pressure built up within the helium reservoir. Lacking sufficient pressure on the propellents, the engine ran roughly until the helium tank finally burst about 40 seconds after second stage ignition when the rocket was 40 to 50 miles from the ground.

The rocket arced over in a ballistic trajectory when about 90 miles high. Telemetry records show that the third stage engine ignited before it plunged into the Atlantic some 300 miles north-east of Cape Canaveral. Tracking stations maintained contact with the vehicle for more than seven minutes.

On June 25, Discoverer IV followed its predecessor to destruction, again as the result of second stage failure. However, on this occasion, the satellite carried only routine test equipment, mainly to check the separation and recovery of the re-entry capsule which in the previous experiment had contained mice.

The most complex, information-gathering, experiment yet attempted with an American satellite was frustrated on July 16 when the Juno II launching vehicle exploded shortly after rising from the launching pad. The launching vehicle was similar to the one which sent Pioneer IV into orbit around the Sun on March 3, and it was the first occasion that the 76-ft., four-stage rocket had been used in an attempt to launch an Earth satellite.

The satellite, which weighed 91½ lb., was described as a "miniature laboratory," being instrumented for seven concurrent experiments, mostly concerned with weather forecasting and cosmic rays.

A Missile Appointment

FROM the Ministry of Supply recently came the announcement that Mr. J. H. Phillips, B.Sc., A.M.I.E.E., F.P.S., had been appointed Director of Guided Weapons Research and Development (Ballistics). In this post he succeeds Dr. B. G. Dickens, C.B.E., Ph.D., who has become Director General, Atomic Weapons.

Born in 1909, Mr. Phillips obtained his degree at London University in 1937 and two years later went to the Telecommunications Research Establishment at Bawdsey. He remained with the Establishment until 1945 when he went to Washington to join the British supply office there.

Returning to this country in 1947, Mr. Phillips joined the guided weapons department of the R.A.E. at Farnborough where he stayed until 1951. In that year he moved to the Directorate of Guided Weapons Research and Development at headquarters in London and became head of the guidance and control section.

Mr. Phillips had another spell in Washington from May, 1957, to February, 1959, as a member of the Joint Services Mission on the guided weapons side. He was subsequently appointed Director of Guided Weapons (Techniques)—which post he held until his new appointment, which took effect on June 15.

Personal Flying

Under this new heading, we are beginning a series of regular features and news items covering the many aspects of light aviation. This will broaden our previous commentaries on clubs and private flying to include some of the rapidly expanding activities such as executive and business operations, and light aircraft procurement in general.

In the United States, personal flying has now outgrown all other categories of civil aviation by formidable proportions. Of the 98,444 civil aircraft registered in the U.S. in October, 1958, 1,834 belonged to scheduled airlines; 1,003 came in the miscellaneous category; and 95,577 were privately owned. The last-mentioned figure comprised 97.1% of the overall total. At the 7,000 civil airfields in the U.S., 51% of the movements up to that time were by private aircraft and only 28% by the airlines.

While personal flying in the U.K. is unlikely to approach these sort of proportions, it is showing signs of becoming considerably more vigorous. In June this year, of the 1,723 machines on the British register, 553 belonged to the airline corporations and independent airline operators; 292 were used for aerial work and miscellaneous flying; 418 were operated by clubs and schools; and 436 were owned by business and private interests.

Now that it is possible to import modern light aircraft from the United States, the numbers of privately owned aircraft in the U.K. may be expected to grow fairly rapidly. At the moment, personal flying has no status whatsoever in this country in the official mind, but we believe that this short-sighted attitude must change. In the past it has not been possible for private owners and operators to negotiate from any position of strength, but their increasing numbers will inevitably result in a more powerful organization to represent their claims.

The purpose of this new series is to further the cause of personal flying by commenting, not too seriously, on matters of interest to everyone engaged in non-scheduled operations, sporting aviation, touring, training and practically everything incurring the displeasure of Berkeley Square or Chancery House. We shall also include from time to time details of new aircraft intended for personal flying, and such other neglected items in the U.K. as radio and associated equipment for the non-airline pilot.

• • •

Most people in the personal flying field must have heard by now of the derestrictions on import licences for American light aircraft, but they may not know the full range of these superlative types, their prices and authorized dealers in the U.K. As a matter of interest, the 1958 sales of the three leading American companies were headed by Cessna, with a total of 2,926 light aircraft distributed, followed fairly closely by Piper, with 2,126, and with Beech a long third, at 694.

These sales, of course, must be related to the value of the types sold, which in the case of the two leading companies amounted to an average of about £6,000 per aircraft, whereas the average cost of the Beech types was about £18,000 per aircraft. The total turnover in each case was therefore similar. It would be of interest to know the number of new British light aircraft sold last year, and the sums involved.

NEW PIPER.—Cheapest of the four-seat American light aircraft now available in this country is the Piper Caribbean, an economy version of the Tri-Pacer, which costs just under £4,000. The 1960 Model is shown here with optional glass-fibre spats.

The principal American light aircraft which are being handled by British dealers are listed in the accompanying table. The cruising speeds quoted are intended mainly as a guide, being the figures from slightly varying power settings between some of the types.

The prices are also only approximate, having been derived from the cost of the standard aircraft, unequipped, in the U.S. plus 17½% import duty in the U.K., and delivery fees. To these must be added C. of A. and registration fees, which may vary from £25 to £150 or so, but the costs quoted enable some idea of the relative prices of the various American light aeroplanes to be obtained.

They may be procured directly through the dealers mentioned in the list, or through the London offices of W. S. Shackleton or R. K. Dundas.

• • •

At a recent flying club at-home, there was a major accident on both days of the week-end programme. Each crash involved a very experienced pilot; each appeared to be the result of pilot error. Both aircraft written off in the accidents were types with reputations of being particularly easy to fly, and with no vices.

The first mishap followed a period of formation low-flying

(*Continued on page 39*)

Type	Seats	B.H.P. Engine(s)	Cruise Speed m.p.h.	Standard Price	U.K. Dealer
Beech J35 Bonanza	4	1×250 Continental IO-470-C	180	£11,375	Aircraft Associates Ltd., 26 Old Bank Buildings, Chester.
Beech 95 Travel-Air	4	2×180 Lycoming O-360-A1A	192	£22,535	
Beech D50A Twin-Bonanza	6	2×340 Lycoming GO-480-G2	200	£39,280	
Beech Super 18	7-9	2×450 Pratt & Whitney R985-AN14B	207	£52,445	
Cessna 150	2	1×100 Continental O-200-A	120	£3,348	Airwork Services Ltd., Airwork House, 35 Piccadilly, London, W.1.
Cessna 172	4	1×145 Continental O-300-A	124	£4,352	
Cessna 182	4	1×230 Continental O-470-L	155	£6 621	
Cessna 310C	5	2×260 Continental IO-470-D	220	£26,380	
Mooney Mk. 20	4	1×150 Lycoming O-320	150	£6,850	Travelair Ltd., 115 Oxford St., London, W.1.
Mooney Mk. 20A	4	1×180 Lycoming O-360	165	£7,270	
Piper Pa-18	2	1×150 Lycoming O-320	115	£3,623	Vigors Aviation, Oxford Airport, Kidlington, Oxford.
Piper Caribbean	4	1×150 Lycoming O-320	130	£3,986	
Piper Tri-Pacer	4	1×160 Lycoming O-320-B	135	£4,193	
Piper Comanche	4	1×180 Lycoming O-360-A	150	£7,203	
Piper Comanche	4	1×250 Lycoming O-540-A	171	£8,881	
Piper Apache	4-5	2×160 Lycoming O-320-B	171	£16,580	

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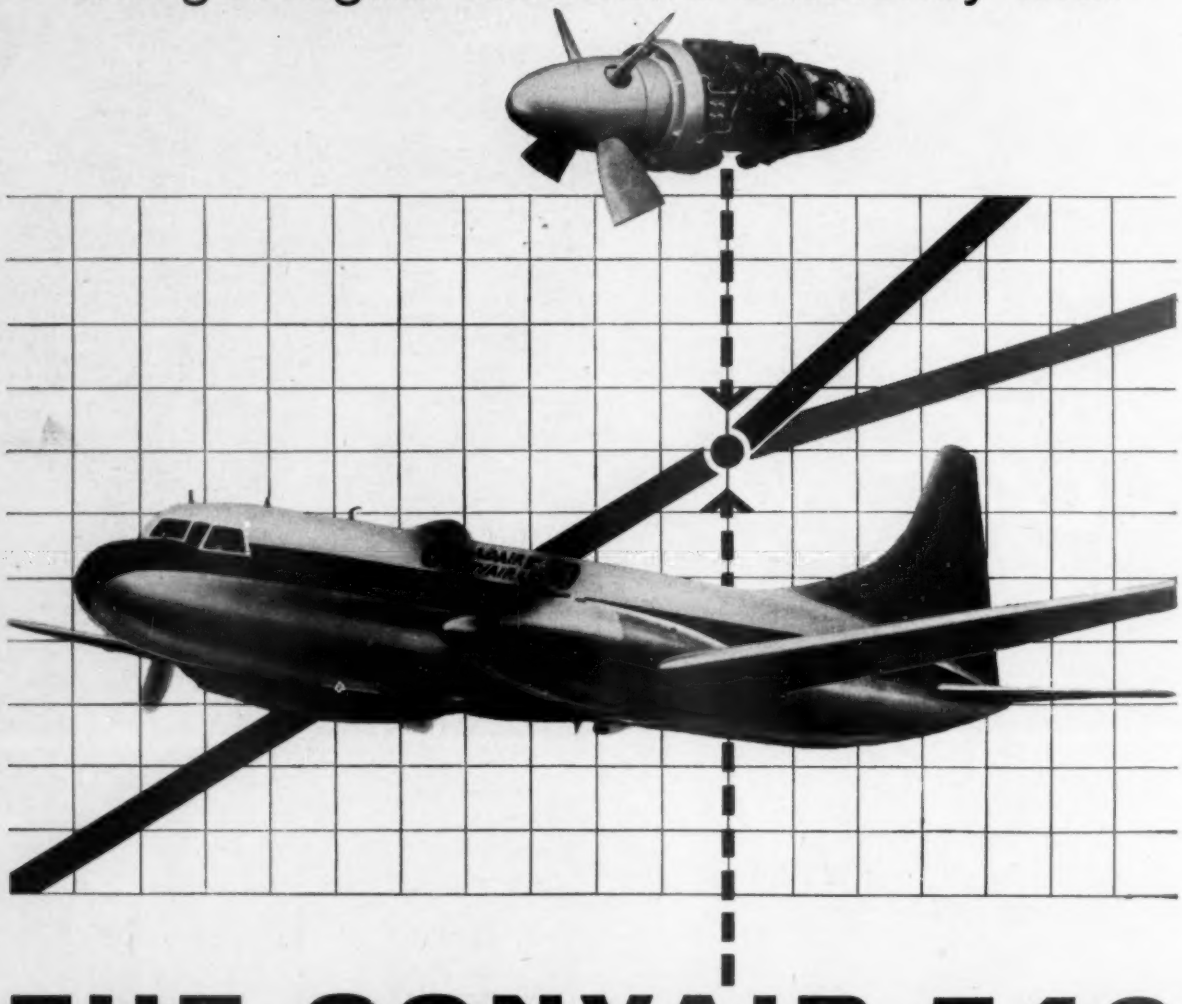


THE CONVAIR 540

Convair 340/440's can now be converted to use Napier Eland engines in a fatigue-free airframe originally designed for jet-props.

The Convair 540 is the conversion equivalent of the Canadair 540 now in military and civil production.

Lower costs · Improved performance · Better passenger appeal

Cheaper and simpler maintenance · Extended service life

THE ELAND HAS
- High aerodynamic efficiency
- Low specific weight
- Low specific fuel consumption
- Single lever control
- Automatic temperature compensation

NAPIER ELAND JET-PROP

D. NAPIER & SON LIMITED, LONDON, W.3. A member of the English Electric Aviation Group

(*Continued from page 38*)

and individual beat-ups by three ultra-light aircraft. One of them, which had been particularly prominent in flying low over the crowd, subsequently appeared to flick out of a tight turn at about 100 ft. and spiralled into a field alongside the aerodrome. Fortunately the wreckage did not catch fire, since the pilot—a former flying instructor—who was seriously injured, was not extricated for some minutes.

On the following afternoon, after a prolonged session of low runs and medium-level aerobatics, the other pilot made a fast dive across the airfield to about 100 ft. in a heavy single-engine aircraft. About half-way across the field he suddenly began a roll, and was about three-quarters of the way round when the aircraft struck the ground and burst into flames a few yards in front of the crowd. The pilot, who had been test flying for many years, was killed instantly, and the accident brought the proceedings to an abrupt and tragic halt.

Neither crash was the fault of the club, which had arranged for sales demonstrations rather than displays, but this sort of accident does incalculable harm to aviation. Both pilots had frequently flown at low altitude over the crowd, and the accidents could easily have resulted in a massacre. Clubs should remind demonstrating pilots that all low-altitude manœuvres are extremely dangerous; that aircraft should never be flown over or towards a crowd; and that the most gentle and docile of aircraft can be provoked only up to a certain point.

• • •

From Wichita we hear that the Beech Aircraft Corporation is planning to enter the lower-priced field of light aircraft with a completely new four-seat design. The Beech Model 33, which is due to fly before the end of this month, is apparently generally similar in appearance to the Bonanza, except for its conventional empennage and swept vertical fin. It is also lighter and has less power than the Bonanza.

The Beech 33 has been designed for economy and to reduce production costs, and is aimed at the $20,000 (say £7,000) price bracket. This will bring it in direct competition with the Piper Comanche, with additional challenges from the Mooney Mk. 20 and some of the Cessna types. It may therefore be expected to be a very advanced design.

• • •

Footnote: To celebrate 21 years of flying training, Derby Aviation has introduced an Air Schools Scholarship giving free training for a private pilot's licence. Wide publicity has been given to this scheme; one application has so far been received.

Gliding Notes

by Dr. A. E. Slater

PERCHED on the summit ridge of Tebay Fell, a thousand feet above sea level, is the clubhouse and hangar of the Lakes Gliding Club. It was not there a year ago—in fact, for two years the club fleet, such as it is, has had to be kept in leaky trailers. The new building, which includes a kitchen and an upstairs dormitory, was built by the members themselves, except for professional help with the roof. And on the occasion of its official opening by Philip Wills, a rally was held over August Bank Holiday week-end.

Any visitor who is at all heavily built may be asked to sit on the roller while John Young drives it up and down the launching track to consolidate the squelchy turf which overlies a thick layer of black peat. From the top of this roller you get a magnificent view over the Lake District mountains to the west and the main line winding steeply up towards Shap summit on its way to Carlisle and Scotland. And from the club's two-seater Venture, launched to 1,000 ft. above the Fell, I saw Morecambe Bay on the horizon, though the Lakes were still hidden among their surrounding mountains.

Seven visiting machines came to the rally, and the club, whose only single-seater is a Tutor, expected them to show what can be done from the site when they can afford a better machine. They were not disappointed, for on the Sunday all seven went away across country.

Philip Wills flew his Skylark 3 58 miles across the Pennines to the Yorkshire Club at Sutton Bank and won the Lonsdale Trophy, presented for annual competition by Lord Lonsdale, the Lord of the Manor, who has given the club a 25-year lease of the site at a nominal rent. Next in order were J. S. Armstrong of Camphill with 41 miles to Skipton, L. Redshaw with 28 miles, both in Olympias; then F. W. Sheppard with 25 miles in the Army Skylark 2, and shorter distances by Paul Minton from Imperial College, Chris Riddell of the Yorkshire Club, and Seth Smith of the Navy. Their direction of travel varied from N.E. round to South, as they used mainly slope lift provided by various ridges, helped or hindered by the sort of clouds which produce up or down currents of large horizontal extent.

Lionel Redshaw, by the way, was one of the founders of the Furness Gliding Club, on the opposite site of the Lake District, in 1931; their site, overlooking the Duddon Estuary, was used in 1932 for a national contest, at which the British distance record was raised from 6 to 13 miles. Their slope faced W.N.W., but the present club, although Tebay Fell faces west, finds its best lift round the corner over Blease Fell, which rises to 1,556 ft. with a steep S.W. escarpment.

Wolf Hirth

WITH the death of Wolf Hirth on July 24 in a gliding accident close to his glider factory near Stuttgart, at the age of 59, there passed one of the World's greatest pioneers of soaring flight. There was a time, in the early 1930's, when he, Robert Kronfeld and Günther Groenhoff, formed a trio of experts far ahead of the rest of the World's sailplane pilots in their skill at cross-country soaring. But his claim to fame does not rest only on his soaring skill.

At the age of 20, Hirth turned up at the Wasserkuppe with a home-built biplane "hang" glider; this was in 1920, at the first of a series of 20 annual contests at which many of the major advances in soaring technique were made. By 1925 he had already learned to fly aeroplanes when, following a motorcycle accident, he lost a leg.

But Hirth went on flying; he won a gliding contest in France in 1928; flew a Klemm from Germany to the Isle of Man T.T. races in 1929; took the same Klemm to the United States (via Iceland) in 1930; and there, at Elmira, made the World's first flight in "dry" thermals (i.e. without cumulus clouds as indicators), besides creating a sensation in New York by soaring a few hundred feet above Riverside Drive in the upcurrent created by the steep bank of the river.

Just after Christmas, 1932, on one of his many visits to England, Hirth gave some lectures to the London Gliding Club on how to find, and circle in, thermals, and introduced his "bubble" theory of their structure, which still holds the field against the rival "stream" theory favoured by Kronfeld. The seed germinated six months later with the first British thermal flights by Eric Collins, soon followed by Philip Wills and Jack Dewsbery.

At this time Hirth was running a gliding school at Grunau in Silesia, where he discovered and trained Hanna Reitsch, had a part in designing the immortal Grunau Baby, and was the first pilot to exploit a standing wave. He continued to compete annually at the Wasserkuppe, and on July 26, 1934, set up a World's record of 219 miles with a flight to Görlitz—only to lose it to Heini Dittmar the following day.

As holder of No. 1 Silver "C" badge, acquired in 1931, Wolf Hirth set out to increase the number of badge-holders. He founded a school specially for the purpose at the Hornberg, near Stuttgart, published a text-book on high-performance soaring (translated into several languages, the English version being called "The Art of Soaring Flight"), and started a factory at Göppingen, near the school, which made sailplanes for advanced soaring: the Wolf, the two-seater Goevier, and the famous Minimoa.

After a nasty crash at Budapest in a Grunau Baby with faulty controls, which kept him in hospital for 7 months during 1936, Hirth had to give up contest flying, though he could still fly both with power and without.

During the War his Göppingen factory was kept busy till it was burned down. He built another one at Teck, likewise near Stuttgart, and after the War it manufactured artificial limbs and furniture till gliding started again in 1951. In this period he was elected president of the German Aero Club.

He was present at every international gliding contest except that of 1948, for which the Allies refused him a visa. Finally, he was recommended for this year's Lilienthal Medal of the F.A.I. for his lifetime's work for soaring flight.

Astronautics and Missile News

DISCOVERER AGAIN.—An auto-stabilized 19 ft. 1,700 lb. Discoverer satellite successfully entered a polar orbit from Vandenberg on August 13. The 300 lb. re-entry capsule believed to have been ejected on the 17th orbit, was not recovered.

TITAN TANTRUM. — At Cape Canaveral on August 14, a Titan I.C.B.M. exploded in flames a few feet above the launching pad. Primary objective was to test stage separation—in flight!

R.A.F. PYROTECHNICS. — On August 14, R.A.F. launching crews in training at Vandenberg sucessfully fired their fourth Thor I.R.B.M.

SPACE "BALLOON."—A Juno II three-stage rocket carrying a 10.2 lb. inflatable satellite of 12 ft. dia., failed on August 15 because of a control fault which ejected the final stage at the wrong angle. Drag studies some 400 miles up were the objective.

SATURN.—A modified Titan first-stage will form the middle stage of the giant Saturn space-vehicle; this three-stage rocket is expected to be capable of landing a ton of research instruments on the Moon. Its first stage will have clustered rocket engines with a total thrust of nearly 1,500,000 lb. and the complete vehicle will stand about 200 ft. high. The project is under the direction of the U.S. Army Ballistic Missile Agency, Alabama. First launching is expected late next year.

BLACK KNIGHT IV.—On June 29, just 19 days after Black Knight III had made a record flight to 500 miles, a fourth Black Knight test-vehicle was launched at Woomera. Four consecutive Black Knight launchings have been successful; the authorities now regard launchings as routine and no further information on height and distance performance will be released.

Next Week

NEXT week's issue, a Space Congress Special, will include a three-page pull-out of artificial satellites, space-probes and future projects drawn to scale, with full tabulated data. It will also deal with the forthcoming Space Congress.

KEEPING TRACK.—A new "pin-point" tracking system which will measure a missile's position in space to within 1/10th of a foot is to be installed at Cape Canaveral. Known as Azusa Mark II, it will automatically track Moon-probes and surface-to-surface ballistic missiles.

GLOBAL TV.—James C. Hagerty, White House Press Secretary, has predicted that an instantaneous, global, telecast relayed by Earth satellites will take place within 30 months.

RESEARCH BY BALLOON.—Over 100 Australian research balloons will be sent aloft in South Africa and South America this year to study cosmic rays and high-altitude winds. Similar studies have already been made in Australia but the work is to be extended to the Equatorial regions because of the distortion in the Earth's magnetic field and its possible effect on cosmic rays.

A L B M PROPULSION. — Aerojet-General will be responsible for R. and D. work on the propulsion of the XGAM-75A air-launched ballistic missile under development by Douglas for the U.S.A.F. Range of this ALBM is reported to be more than 1,000 miles.

General Aviation News

NEW VARIANTS. — Latest Hunter variants are the F.R.9 and F.GA.10, respectively fighter-reconnaissance and ground-attack versions of the F.6 with Avon 203 engine. The Javelin F.AW.9 is essentially the F.AW.7 with re-heat Sapphire engines and small equipment changes. The three Britannia 252s now in service with Transport Command are designated C.2 and the two Royal Flight Whirlwinds are H.CC.8s. Latest Jet Provost, with Viper ASV.11, is the T.4 and the export Jet Provost is the T.51.

BRISTOL SIDDELEY B.E.58.—The new B.E.58 ducted-fan engine will be exhibited in public for the first time at Farnborough. Its thrust is about 17,000 lb. and its cruising s.f.c. is claimed to be at least 10% lower than that for the best turbojets. By-pass ratio is 1½ to 2. Other features are a high thrust/weight ratio and low noise level. Another engine in the new Bristol Siddeley range of ducted-fans is the recently announced B.E.53, which is designed to produce both lift and thrust.

CONWAY PROGRESS. — Rolls-Royce-engined Boeing 707-420 and Douglas DC-8 jet airliners will enter service with Conway by-pass engines each having a guaranteed minimum take-off thrust of 17,500 lb. instead of the 16,500 lb. originally specified. This new rating has been introduced more than a year earlier than promised.

AVON OVERHAUL LIFE. — The A.R.B. has approved a 1,300-hr. overhaul life for the Rolls-Royce Avon R.A.29; the engine can also be run 1,600 hr. between overhauls on a trial basis. In nine months of Comet 4 operations by B.O.A.C. only one unscheduled R.A.29 overhaul was needed during the 49,000 engine hours flown.

BRISTOL 188 ENGINES.—Powerplant of the Bristol 188 stainless-steel supersonic research aircraft is the de Havilland Gyron Junior D.G.J.10, which has a dry rating of 10,000 lb. thrust. Two of these engines with reheat are being installed in a test-bed Javelin by Napier at Luton.

BRITANNIC DATA.—The prototype Short S.C.5 Brittania is now expected to fly in 1962 (rather than 1961) according to the Minister of Supply. It will "fully enter service" in 1964. Revised Britannic data are: span, 158 ft. 9⅛ in.; length, 136 ft. 5 in.; gross weight 218,000 lb.; max. payload, 85,000 lb.

TWO DISPLAYS.—On August 29, branches of the R.A.F.A. in Wolverhampton and Colwyn Bay are holding air displays, with Service and civilian support.

LATEST P.531.—The Mk. 2 version of the Saunders-Roe P.531 helicopter powered by a Blackburn A.129 free-turbine engine, made its first flight on August 9. It was flown by Mr. Ken Reed, the company's chief test pilot.

707 UNDERCARRIAGE.—According to a Boeing engineer the recent undercarriage failures on 707 airliners have been caused by snubber failures. These failures allowed the wheel truck-beam to pitch to extreme angles against a bolt head, causing fatigue failures. The Federal Aviation Agency has ordered the inspection of all truck beams and their immediate replacement if they have impact dents deeper than 0.005 in. The Agency has also ordered the installation of new-type hydraulic pumps.

GERMAN AIR SHOW.—According to the Federation of the German Air Transport Industry a German Air Transport Exhibition is to be held next year. Held in conjunction with the German aircraft industry, the Show will be from April 24 to May 3 at Hannover Airport. The intention is that future shows will be held at two-yearly intervals, thus alternating with the Paris Aero Salon.

FOCKE FIRST.—West Germany's first post-war helicopter made its first flight on July 24. Designed by Prof. Focke and built by Borgward of Bremen it is known as the Kolibrie I. It carries a pilot and two passengers.

BUDDY CANBERRA.—One of Flight Refuelling's probe-equipped Canberra B.2 test beds has been used for development of the Mk.20 Refuelling Pack which is a self-contained ram air turbine-driven unit for attachment below the wings of fighters or strike aircraft. The Mk.20, or 150 gal. "buddy" pack will enable operational aircraft to be converted for tanker duties in one hour.

WESTLAND ORDER.—Four more Whirlwinds with spares and equipment have been delivered to the Austrian Air Force; these supplement six Whirlwinds, supplied by Westland to Austria more than a year ago.

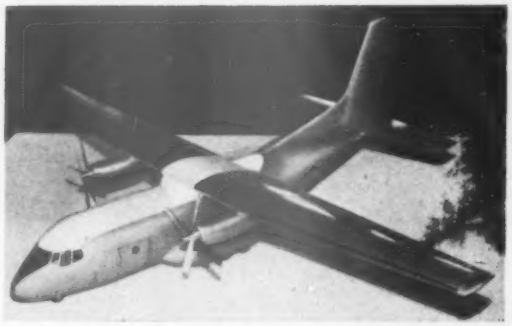
HEAVIER F-27s.—By September, Fokker expect to increase the gross weight of the F-27 from 35,700 lb. to 37,500 lb., and the max. landing weight from 34,000 lb. to 35,700 lb. The range with max. payload will increase from 350 to 650 naut. miles.

MIRAGE FLOWN.—Maiden flight of the Mirage IV twin-jet delta-wing bomber was made on June 17 from Melun-Villaroche. It was flown by R. Glavany, Dassault's chief test pilot.

COMET TRIBUTE.—The Elmer A. Sperry Award for 1959 has been given to The de Havilland Aircraft Co. for "the vision, courage and skills displayed in conceiving, developing and producing the World's first jet-powered passenger transport aircraft."

AN-10 IN SERVICE.—The Antonov An-10 has gone into Aeroflot service on the 800-mile Moscow-Simferopol (Crimea) service.

AERIAL JEEP.—The latest version of the Piasecki SkyCar made its first flight on June 28. It is powered by a Turbomeca Artouste IIB shaft turbine mounted transversly on the port side of the craft and driving the front and rear rotors. This version is designated VZ-8P.



TRANSALL TRANSPORT.—This twin-Tyne transport, the Transall C.160, has been planned jointly by Nord, Hamburger - Flugzeugbau, Weser Flugzeugbau and Blume Leichtbau and Flugtechnik. It has a gross weight of 90,390 lb.

COLEOPTER CRASH.—On July 25, the SNECMA Coleopter crashed and caught fire at Melun-Villaroche. Reports state that it had been climbed vertically to about 260 ft. and the pilot, August Morel, could not control it during a transition to level flight; he baled out and escaped with bruises.

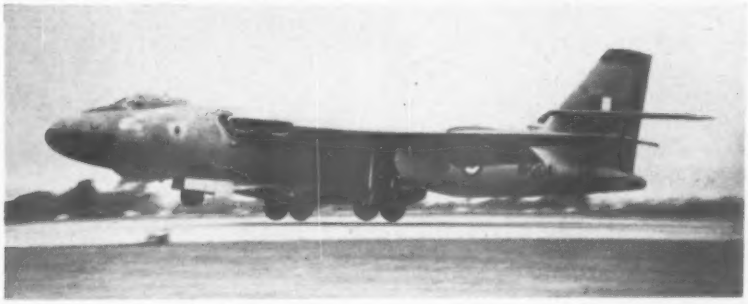
SAFIRS FOR FINLAND.—Ten more Saab Safir 91D trainers have been ordered by the Finnish Air Force; its first order was for 20.

F-27 ORDERS. — Quebecair has ordered a third F-27 from Fairchild, which now has 73 firm orders for the type. Bonanza Air Lines operating three F-27As since March, has ordered four more of the R.Da.7-powered version.

CONVAIR 880 SALE.—An order for one Convair 880 Model 31 (intercontinental) has been placed by Civil Air Transport of Taipei, Taiwan, the flag airline of Nationalist China. To be named "The Mandarin Jet," the 880 will be delivered in November, 1960.

GLIDING WINNER.—Philip Wills won the Netherlands Gliding Championships at the end of last month. He obtained 7,706 points out of possible 8,000.

JETSTAR SALE. — A JetStar (four JT-12 turbojets) has been ordered by the Canadian Department of Transport, for delivery in June, 1961. It will be used to evaluate navigational radio aids at high altitude and for other ATC development trials.



STAND-OFF MOD.—This Valiant has been modified for use in development of the Avro Blue Steel stand-off bomb. A successful air-drop has been made and the Valiant has been delivered to Avro.

News About People

ROYAL PRESIDENT.—H.R.H. Prince Philip, Duke of Edinburgh, has graciously consented to become the president of the Chelsea College of Aeronautical and Automobile Engineering for one year. In November, he will succeed Lord Brabazon who has been the College's president since the death of its founder-president Lord Wakefield. This news was given at the inaugural Wakefield Memorial Lecture by Mr. Peter Masefield on June 24.

MASTER PILOTS.—G.A.P.A.N. has awarded Master Air Pilot Certificates to V. E. Arnold, instructor for Short Bros. & Harland since 1947; K. M. Reed, Saro chief test pilot (helicopters); Capt. P. R. Griffin, assistant flight manager, B.E.A. Viscount 800 flight; Capt. R. F. Noden, D.S.O., D.F.M., B.E.A. Viscount training captain; Capt. R. T. F. Gibson, Eagle Airways (Bermuda), Ltd.; Capt. J. N. M. Weir, lately B.O.A.C. chief of flight operations; and Barry Radley, Hunting Aircraft deputy chief test pilot.

CRANFIELD PRESENTATION.—At the College of Aeronautics' Presentation Day at Cranfield on July 3, the guest speaker was the First Lord of the Admiralty, the Earl of Selkirk, P.C., O.B.E., A.F.C. He presented the Governors' Prize to Mr. A. G. J. Baker who also won the S.B.A.C. Prize in Aircraft Propulsion and the R.Ae.S. Prize for 1958. Flt. Lt. H. G. Flegg, R.A.F., won the Principal's Prize and the Woods of Colchester Prize in Aircraft Electrical Engineering. Mr. T. M. Harris won the Woods of Colchester Prize in Aerodynamics; the S.B.A.C. Prize in Aircraft Design went to Mr. J. L. Kirton; and the S.B.A.C. Prize in Aircraft Economics and Production was won by Lieut. I. E. J. Bowles, R.N. Seventy-five diplomas were presented.

A.R.B. APPOINTMENT.—Capt. E. C. Miles, a B.O.A.C. senior captain, deputy president of IFALPA and member of the Board's flight requirements sub-committee, has been appointed a member of the A.R.B. Council in succession to Capt. T. H. Farnsworth.

B.M.B. SALES.—Mr. G. T. P. Gardner has been appointed sales director of B.M.B. (Sales), Ltd., Crawley, the sole selling agent for British Manufactured Bearings Co., Ltd., John Bass, Ltd., and Pathfinder, Ltd.

SAFETY APPOINTMENT. — Sir Victor Tait, K.B.E., C.B., chairman of International Aeradio, Ltd., and the Air Transport Electronics Council, has been elected to the board of the Flight Safety Foundation of America.

MESSIER APPOINTMENT. — Mr. E. J. Nicholl, joint managing director of Dowty Equipment, Ltd., has been appointed a director of British Messier, Ltd.

ATCHERLEY TWINS.—John Pudney is writing a book about Air Marshal Sir Richard Atcherley, who has given him access to his papers and to those of his brother. He would be grateful to hear from any reader who feels disposed to help with information, anecdotes or papers about them. His address is: Cherry Orchard, Fairwarp, Uckfield, Sussex.

ELECTRONICS POST.—Dr. C. B. Speedy, Ph.D., B.E.Hons., A.A.I.E.E., well known for his work on electronic data processing and a director of Gresham Developments, Ltd., has been elected to the board of Lion Electronic Developments, Ltd., of Feltham, Middx.

LUFTHANSA APPOINTMENT.—Mr. Oskar Dubral has succeeded Mr. Joachim von Frankenberg as manager for the U.K. and Eire. Mr. von Frankenberg has returned to Cologne as general sales manager.

(*Continued on page 42*)

CANADIAN AVRO.—Following the resignation of Mr. F. T. Smye (see p. 4 of last week's issue under the same heading), Mr. H. R. Smith has been appointed executive vice-president of the Aeronautical Division of A. V. Roe, Canada, Ltd. Mr. Smith has been with Avro Canada for seven years and was responsible for the tooling and production of the CF-100 and Arrow.

H.D.A. APPOINTMENTS.—Mr. J. F. Robertson, C.A., a director and Group treasurer of the Hawker Siddeley Group, joins the board of High Duty Alloys, Ltd. Another new H.D.A. director is Mr. I. C. Dick, C.A., the company's secretary.

CANADIAN EXECUTIVES.—Formed in Toronto as a division of the Canadian (Aircraft) Owners and Pilots Association is the Canadian Business Aircraft Operators, whose sole purpose is the advancement of business aviation. It is a national organization, accepting for membership any Canadian company which employs professional pilots to fly company-operated aircraft.

ROTOL, INC.—Mr. V. N. Thacker has been appointed president of Rotol, Inc., in succession to Mr. Jack Staples, who is returning to England to take up an appointment with the parent company. Mr. Thacker was formerly with Fairchild.

D.H. CANADA MISSILES. — Mr. Douglas B. Annan, D.F.C., A.F.C., C.D., has been appointed sales manager of D.H. Canada's Guided Missiles Division. He joined the company in April after being chief engineer and production manager of the Norton Co. of Canada.

S.B.A.C. SCHOLARSHIPS.—The following have been awarded 1959 University Scholarships by the S.B.A.C.: W. T. Anderson, Short Bros. and Harland, Ltd.; K. H. Champion, Bristol Siddeley Engines, Ltd.; B. Maskew, Blackburn Aircraft, Ltd.; B. R. Perkin, Blackburn Aircraft, Ltd.; D. F. Pilkington, A. V. Roe and Co., Ltd.; W. G. Roberts, A. V. Roe and Co., Ltd.; M. G. Thomas, Hawker Aircraft, Ltd.

PIONEER ENGINEER.—Mr. Arthur Mann, Assistant Director, Directorate of Aircraft Propulsion, M.o.S., who died on July 16, served an apprenticeship with the Admiralty from 1917 to 1922. Subsequently he spent some years with William Beardmore and Albion Motors as research engineer on aero-engines. He joined the A.I.D. in 1935 becoming assistant chief inspector; he went to the D.A.P. in 1946.

Commercial Aviation Affairs

B.E.A.-OLYMPIC LINK.—A consortium agreement between B.E.A. and Olympic Airways is to come into effect next April, subject to the approval of the Greek Government. The agreement provides for joint operation and commercial exploitation of their route networks between the U.K., Greece and the Eastern Mediterranean. Olympic Airways has ordered two D.H. Comet 4Bs, for delivery next February. These aircraft will be maintained in Britain by B.E.A., which will contribute two of its own fleet of seven Comets to the pool.

VANGUARD IN CANADA.—Continuing its flight trials, the second Vickers Vanguard, G-APEA, flew to Canada on June 29. Two demonstration and three T.C.A. familiarization flights were made in Montreal and Toronto, and the Vanguard returned on July 5. Sector distances and average speeds were as follows: Wisley-Prestwick, 345 mi., 325 m.p.h.; Prestwick-Keflavik, 920 mi., 390 m.p.h.; Keflavik-Montreal, 2,360 mi., 380 m.p.h. (30 m.p.h. headwind); Montreal-Gander, 980 mi., 360 m.p.h.; Gander-Wisley, 2,365 mi., 440 m.p.h. (50 m.p.h. tailwind).

TRAFFIC CONFERENCES.—IATA's annual Traffic Conferences will be held in Honolulu starting on September 22. Mr. W. Gordon Wood, vice-president of T.C.A., will preside.

MOSCOW EXPANSION.—A third airport opened for passenger services in Moscow on August 11. Sixteen miles from the city centre, it is being used initially to handle six Tu-104B services a day to Leningrad, and other local flights.

HERALD CHANGE.—An all-up-weight increase of 2,000 lb. (to 39,000 lb.) has been approved for the Handley Page Dart Herald. It has also been cleared for a landing weight of 38,500 lb. The payload over a 500-mile stage will now be 12,000 lb., or 1,100 lb. more than that previously quoted. Several take-offs have been made at 41,000 lb.

DOUGLAS FREIGHT PROJECTS.—Two designs based on the DC-8 have been proposed by Douglas for military or commercial freight carrying in 1965. Both have swing tails and 25,750 lb.s.t. JT-4D turbofans. The smaller, commercial model, would be slightly larger than a DC-8, providing 11,500 cu. ft. of cargo capacity. Gross weight would be 375,000 lb. and range with 80,000 lb. payload would be 3,700 nautical miles cruising at Mach 0.82. Larger military proposal would weigh 480,000 lb. and carry 100,000 lb. across the Atlantic or 80,000 lb. across the Pacific, cruising at Mach 0.8. Span, 177 ft. ; length, 167 ft.; and cargo volume, 14,600 cu. ft.

CONWAY DC-8.—First flight of the Conway-engined DC-8, the ninth from the Long Beach production line, was made on July 23. It is one of six for T.C.A. United Airlines will introduce DC-8 services on September 18.

ARCTIC APPROVAL.—The new air agreement between France and the U.S.A. permits Air France to operate flights between Paris and Los Angeles or San Francisco over the Arctic route. The new agreement gives French airlines traffic rights in Alaska and at Baltimore and a route between New Caledonia or Tahiti to San Francisco or Los Angeles. Otherwise the agreement follows that of 1946.

HELIPORT REVIEW.—The M.T.C.A. has set up a technical committee to formulate requirements and to advise on possible sites for helicopter stations in the London area. It comprises representatives of the L.C.C., British Transport Commission, B.E.A. and the M.T.C.A.

THIRD 880 FLIES.—A third Convair 880 (the fourth off the production line) made its first flight on August 10. It is the first built in production configuration and will be used for accelerated service testing. F.A.A. certification flights are to begin next month, with deliveries to T.W.A. scheduled for November and to Delta in January.

B.W.I.A. EXPANDING.—Starting in October, a Britannia 312 service will be operated by B.O.A.C. in B.W.I.A. colours between London and the East and West Caribbean. Long-range aircraft are to be acquired by B.W.I.A. for this route by 1961. B.O.A.C. and B.W.I.A. have agreed to continue operating the existing services in the Caribbean, with extension to Dominica and St. Vincent as soon as airfields are ready.

NEW U.S. OPERATOR.—With a fleet of two DC-4s, Seven Seas Airlines has been formed in Delaware to undertake passenger or cargo charters. Offices have been established in New York and at Schiphol Airport.

JET CLIPPER SERVICE. — Pan American will introduce Boeing 707-320 Intercontinentals on their Arctic route from Los Angeles and San Francisco to London on August 26, and on their San Francisco-Tokyo route on September 5.

707 INCIDENTS.—A Boeing 707-120 of American Airlines crashed on August 15 while on a training flight over Long Island. The crew of five were killed. An American Airlines spokesman is reported to have said that "The aircraft apparently got away from the pilot. Perhaps he made too tight a turn." A Qantas 707 landed at Brisbane on August 16, after an engine failed on a flight from Sydney to San Francisco. Cross-winds of up to 55 m.p.h. at Sydney prevented it from landing there.

COMET EXTENSIONS. — B.O.A.C. plans for increasing Comet services this summer include the introduction of five extra services a week between London and New York (making 12 in all) and a second London-Montreal service. From the beginning of June, two additional Comet services have operated between London and Hong Kong, with stops at Zurich or Rome, Beirut, Bahrein, Bombay, Colombo and Singapore. This month, two more services will be provided to Singapore, and a once-weekly "cannon ball" service to Hong Kong in 20 hr. 30 min., stopping at Beirut, Karachi and Rangoon.

AGE LIMIT PROPOSED. — F.A.A. has proposed a new ruling to limit to 60 the age of pilots engaged in regular flying on U.S. airlines. Pilots would not be allowed to convert to new types of turbojet transport after they were 55. Other proposed rules will require co-pilots to have type ratings on the aircraft they fly, and to have bi-annual proficiency checks. All passenger-carrying transport will be required to carry weather radar under another proposed rule.

POLAR TURBOJET.—On August 26, Pan American will start twice-weekly flights with the Boeing 707 Intercontinental between London and the U.S. west coast over the Arctic route.

TROOPING CONTRACTS.—Hunting-Clan Air Transport has been awarded long-term trooping contracts to Cyprus and to Nairobi and Aden, using Britannias and DC-6Cs.

SAVING ON THE 707.—B.O.A.C. are participating in a combine of Boeing 707 operators to pool spares at overseas stations. As a result, the Corporation expects to hold its own spares at only seven stations instead of 19. Another saving is expected to be made with a new maintenance scheme, combining component set lives with base transit checks every 50 flying hours, a 200-hr. check, and an annual "major" at 3,000-3,500 hr. The Conway will start life at 600 hr. between overhauls rising to 1,900 hr. by the end of 1961.

DUTCHMAN. — The first K.L.M. Electra is also the first international Model L-188C, with extra fuel, full navigator's station, seat tracks, movable bulkheads and extra toilets. TEAL, Qantas and Garuda have also ordered L-188Cs.

T.W.A. SELL 707s.—Six of the 18 Boeing 707-320s ordered by Hughes Tool Co. on behalf of T.W.A. have been transferred to Pan American, increasing the latter's total 707 fleet to 29, including six 707-120s. The transfer is thought to be due to Hughes Tool's difficulties in arranging long-term financing. The 15 707-120s delivered to T.W.A. so far are on short-term leasing arrangements from Boeing.

ALTITUDE WARNING.—B.E.A. is installing a Mechanism, Ltd., warning lamp on its Viscounts, to give a flashing amber light when the aircraft passes the 10,000-ft. level in either direction. The light continues to flash until cancelled by the pilot, when it is automatically reset.

MANSTON IN USE.—Silver City Airways opened their Manston-Le Touquet service, using two 68-seat Hermes, on June 15. The service is part of a seven-hour rail-air-rail link between Victoria, London and Gare du Nord, Paris.

BRITISH RADIO FOR AEROFLOT.—Airborne ILS/VOR equipment has been ordered for Aeroflot from Standard Telephones and Cables for use on the Tu-104s on the Moscow-London service.

VISUAL APPROACH AIDS.—The R.A.E.'s visual glide-path indicator system is eventually to be used at all main M.T.C.A. airports. The first installation was laid down at London Airport on June 25 for use on 28L—the southernmost of the two main runways. Nutts Corner, Belfast, is to be the second airport equipped.

STRATOCRUISERS RETIRED. — B.O.A.C. flew its last scheduled service by Stratocruiser on May 31, from West Africa to London. In 10 years of service, 17 of these Boeing transports have carried some 680,000 passengers; flown 247,550 hours; crossed the Atlantic 12,804 times and made 53,974 landings. Fourteen of the fleet are being sold back to Boeing and most of these have already returned to Seattle.

IATA MEMBER.—Hawaiian Airlines, Ltd., has joined IATA as an associate member, bringing total membership to 89—80 active and nine associate.

Military Aviation Affairs

JET TRAINING.—On June 26 the first batch of six production Jet Provost Mk. 3s were handed over to the R.A.F. during a ceremony at the Hunting Aircraft factory at Luton. This followed the granting of the M.o.S. release on June 5 approving the acceptance of the new trainer for regular basic jet training at Service flying schools.

R.C.A.F. STARFIGHTERS. — The Canadair Sabre 6s of the European-based day fighter squadrons of the Canadian NATO Air Division are to be replaced by Lockheed F-104G Starfighters which will probably be built in Canada by Avro.

NO. 23 GROUP.—The Headquarters of No. 23 Group, Flying Training Command, is to move from Oxenden House, Leighton Buzzard, to Church Fenton in September. The Group has been at Leighton Buzzard since October, 1939.

GERMAN AIRCRAFT.—The budget committee of the Bundestag has approved the building of 250 F-104 Starfighters and 150 Fiat G-91s by Flugzeuggruppe Süd, to which Heinkel, Messerschmitt, Siebel and Dornier belong. The orders are estimated to amount to approximately 1,095,500,000 marks (£92 million) and the first Starfighter is expected to be delivered in about 26 months and the first G-91 in 20 months. The J79 engines are to be built by B.M.W. and Klöckner-Humboldt-Deutz.

I.A.F. GNATS.—The Indian Government recently cleared the Folland Gnat Mk. 1 for general introduction into squadrons of the Indian Air Force. Folland has an Indian contract for 25 complete Gnats and 20 sets of components, together with an order for tooling and spares. Hindustan Aircraft, Ltd., is to build approximately 100 aircraft under licence.

AMERICAN DEFENCE.—The first in a series of new, high power, multi-beam radar systems for United States continental air defence has been delivered to the U.S.A.F. by U.S. General Electric. To supply radar data to the SAGE (Semi-Automatic Ground Environment) Continental Air Defence System, the new radar system is capable of detecting aircraft at significantly higher altitudes and longer ranges than present air defence radars.

It was designed and developed for the U.S.A.F. by the U.S. Air Research and Development Command in co-operation with General Electric.

U.S.A.F. RE-DEPLOYMENT. — Following the French Government's refusal to allow the stockpiling of nuclear weapons on French soil, the U.S.A.F. is withdrawing nine fighter-bomber squadrons, consisting of 225 aircraft and 6,000-odd personnel, from bases in Eastern France. Some of these strike squadrons (F-100s) are being transferred to Germany to replace tactical reconnaissance squadrons which are being moved to the U.K.

R.A.A.F. NEPTUNES.—A flight of three R.A.A.F. Neptunes, the first of 11 to be fitted with J34 turbojets at Lockheeds, California, are returning to Australia this month. The remaining eight aircraft will follow in groups and the entire £775,000 modification programme is expected to be completed before the end of the year.

AIR MOBILITY.—An Air Movements Development Unit has been formed in Transport Command at R.A.F. Abingdon. Commanded by Sqn. Ldr. E. Taylor, the unit will study and make recommendations on the methods of, and equipment required for, loading, lashing and packaging of equipment and stores for transport by air. It will also study air mobility requirements of squadrons.

Correspondence

Six Types in a Day

"TYPEHUNTERS' CORNER" (May 8, 1959) stimulated memories of flight engineering with the A.T.A.

On April 8, 1944, I flew in six different types of aircraft, last landing time only preventing a seventh:—

Wellington: Belfast to Aldergrove.
Anson: Aldergrove to Kirkbride.
Avenger: Kirkbride to Hawarden.
Stirling: Hawarden to Brize Norton.
Argus: Brize Norton to Wroughton.
Walrus: Wroughton to Sealand.
Oxford: Sealand to Belfast the following day.

The pilot was Flight Captain L. Warren of Malvern, Gloucestershire.

Lovely Banks, Victoria, Australia. THOMAS BURSTOW.

Getting There First

WE like to think that our aero-engineers are as good, if not better, than those of the U.S.A., but there is no doubt that the Americans are much better businessmen. These things may happen if we build a long-range supersonic airliner:

1. If we build Mach 2 they make it obsolete with Mach 3.
2. If we build Mach 3 they may build Mach 2 first and sell so many that nobody can afford ours.
3. They may bluff us into abandoning a Mach 2 or 3 by bringing out a "Mach 3" or "5" which cruises in service at 2.1 or 3.1.

For the long range our money would be better spent on laminarization—the H.P. 113 appears to be practically a scale model of the V.C. 10.

The short-range Mach 1.2 airliner seems to have the following advantages:—

1. The short-range market is much bigger.
2. The Americans do not *seem* to be interested.
3. With acceptable accelerations and cabin attitudes giving a minimum time to reach Mach 1 at permissible altitudes it is difficult to see how a substantially faster airliner could be produced within the working life of our own.
4. It should be much easier and less expensive.
5. We stand an excellent chance of gaining the prestige of producing the "FIRST SUPERSONIC AIRLINER."

Of course you know who would probably call it transonic.

Leicester. B. A. MURPHY.

Saving one Sunderland

IT was with great regret that I read in THE AEROPLANE AND ASTRONAUTICS, May 15, that the last two Short Sunderlands in service with the R.A.F. were due to end the 21 years of operations by this type on that date. The more so as the two in question had been granted a reprieve when Shackletons started re-equipping the unit involved, No. 205/209 Squadron, last year.

It is most fortunate that steps have been taken to preserve at least one example of each of the most important British aircraft of World War II. These include the Spitfire, Hurricane, Mosquito, Wellington, Lancaster, Swordfish, Gladiator and Fulmar. There is still time to save the Beaufighter, Oxford, Anson, Tiger Moth and, possibly, a Tempest. It is, I suppose, too late to save a Typhoon, Blenheim, Beaufort or Halifax. What of the Sunderland?

To start with, this remarkable aircraft has served operationally far longer than any other British type. It was the only completely effective maritime-reconnaissance aircraft we possessed at the outbreak of war. I doubt if any other type in any of the air forces involved sank or crippled as many U-boats, except possibly the Wellington or Liberator.

Ivan Southall, in his enthralling book, "They Shall Not Pass Unseen," gives one a very good idea of what the Sunderland meant to those who flew it, worked on it, were protected by it at sea and were rescued by it. When he writes about the hundred-plus U-boats at sea in the spring of 1943 being employed to cut the main artery between N. America and Britain, his cryptic sentence: "They came dreadfully close to doing it," makes one realize what the nine Sunderland squadrons, then serving Coastal Command in greater numbers than any other type, meant in terms of our survival.

The Sunderland was (and is) a weapon of war and many not particularly interested in aviation may argue that it is better gone as such. But even these people should remember these points. In the first place, its task was not the mass-bombing of cities, the destruction of other aircraft, the sinking of merchant ships and the destruction of trains. The Sunderland had one all-important enemy, which it fought with courage, persistence and success in the longest and perhaps bitterest battle of the War—the Battle of the Atlantic, which started the day war broke out and finished when the War ended. This enemy was the submarine—beyond question the most evil and repellent weapon used in "conventional" war. The very sight of the great white boats circling over ships at sea was often sufficient to prevent attack. Truly the Sunderland saw that our daily bread reached us in safety.

Should not a Sunderland be kept in flying condition and tour stations that are open on "Battle of Britain" Saturday? As the first, the last and best-equipped home of the Sunderland, Pembroke Dock, with its empty hangars, would be ideal. Or Wig Bay, in Scotland. There are many experienced flying-boat pilots, in and out of the R.A.F. today, who would willingly fight for the privilege of flying this venerable flying-boat on display days.

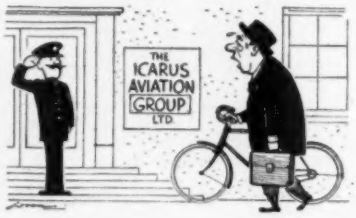
THE AEROPLANE has always worked untiringly for the advancement of flying of all kinds and has at all times strenuously supported worthy causes. I do beg of you to spare some space for this letter in the hope that enough supporters may be found to save for posterity one of the most wonderful aircraft that ever took the air and one which symbolizes the very spirit of the R.A.F. and Air Forces of the British Commonwealth.

Pantgwyn, Cardigan. PETER F. M. THOMAS.

Groundabout

Wrenaissance. After being grounded for all these weeks the Wren bird takes wing again—normal service is now resumed. The first item for your sympathetic consideration is this small ad. from a re-born local paper. It really wraps up the changed aviation picture, don't you think?

1955 . . . fitted radio, htr. A car for the connoisseur. Maintained regardless of cost for managing director of large aircraft concern. £1,175.



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From My Favourite Line Book

Ex-Hunter pilot from 2nd T.A.F.: "Never could tell where the border was, but we always knew we were there by the MiGs out on the wing-tips."

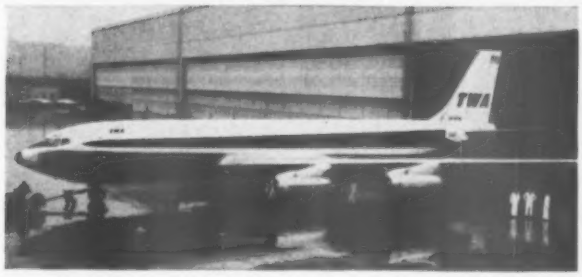
*

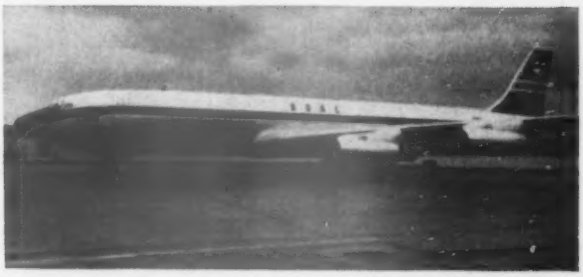
Décor Diversion. I like the subtle propaganding touch in the 84-seat buses which B.O.A.C. are sending to Karachi, Calcutta and Bangkok for transporting Qantas 707 passengers within the airports. The interiors are designed to match the cabin décor of B.O.A.C.'s Comet 4. Of course, there *is* the chance that the passengers may make un-B.O.A.C. comparisons—if they notice anything at all, which I doubt. One grey is very much like another.

*

Pause for Inspiration. Nearly everybody reckons he (or she) has got (a) a sense of humour, (b) a lively imagination, (c) some artistic perception. Here's a chance to exercise all three. What title would you give this sculpture? Such as "Overloaded American Pilot Coveting Decca." Automotive Products title it "Flame-Washed Steel Casting" but don't let that stultify your (a), (b) or (c).

by Gremlin





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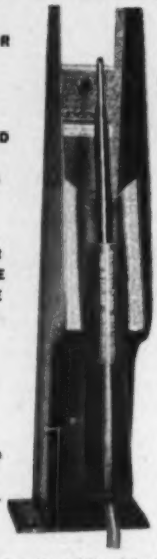

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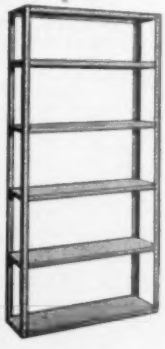

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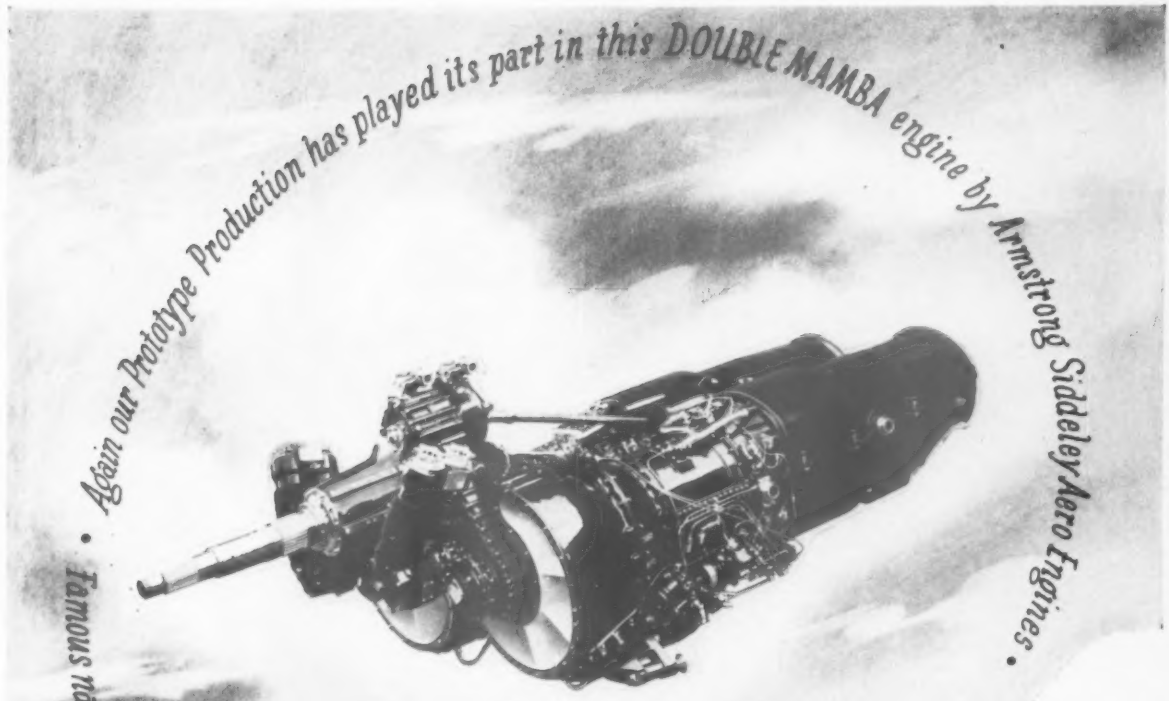
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